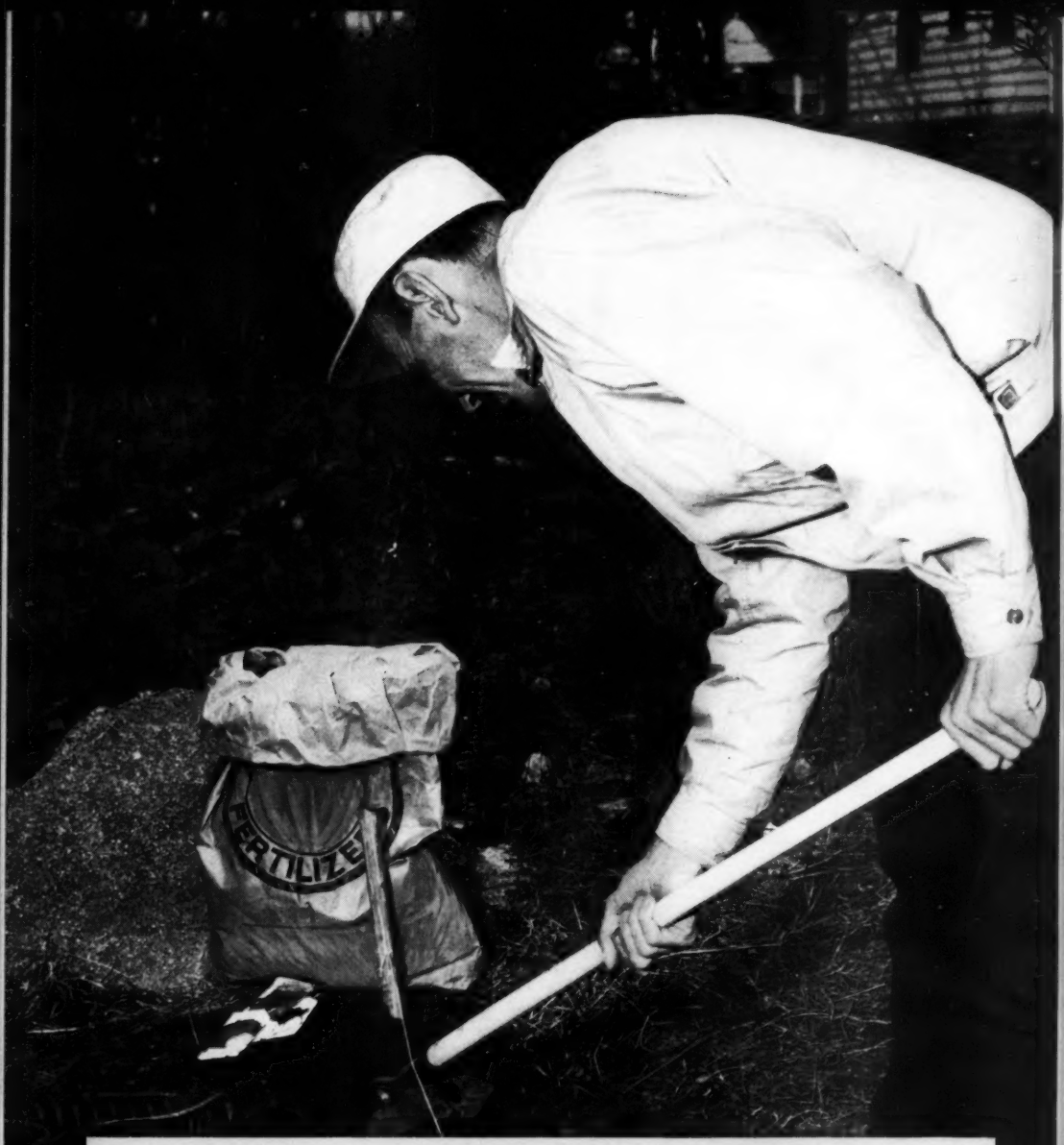
Better Crops

WITH PLANT FOOD

May—June, 1959

20 Cents



WHERE IT NEEDS IT WHEN IT NEEDS IT

Dr. John Carew, well-known Michigan State University horticulturalist, says: "You might compare the fertilizing of vegetables with the feeding of humans. Both need easily accessible sources of nutrition in their youth, a continuous balanced supply during their entire life, and both can be harmed by excesses."

Whether you are banding fertilizer in rows for a new vegetable garden or mixing plant food in a hole for a new shrub, your goal is the same—to make sure your plant has easily accessible nutrition where it needs it when it needs it.

In this issue, you will find advice on how to raise and feed good shrubs, shade and flower trees, small fruits, roses, other ornamentals, fruit trees, and a successful vegetable garden. The advice is given by top specialists in their fields. We invite you to read what they say—and then secure the advice of your local specialists.

sm—editor

ON THE COVER . . .

. . . it takes more than wood, mortar, and brick to make a house a home.

The landscape in which the modern home sits is almost as important as the quality of the house itself.

Actually a very modest, relatively unattractive house can be made to look quite impressive with a little imagination and some pleasant work on shrubs, flowers, and trees.

To complete the conversion of a house into a home, add a garden of vegetables and fruit and you have the recipe for a highly livable, economically valuable piece of property.

And that's what this issue of *Better Crops* is about—how to grow garden plants and trees in a way that will make your house a more valuable home.

In it, you will find tips on . . .

. . . growing fruit trees and fertilizing small fruit.

. . . an easy-to-follow menu for your home vegetable garden.

. . . ornamentals as a good route to a colorful landscape.

. . . rose culture, ranging from the location of your rose bed to the spacing and fertilizing of your plants.

. . . when, where, and how to fertilize your shade and flowering trees.

. . . making shrubs more hardy through proper nutrition.

. . . some gardening ABC's—including preparation, proper care, and follow-through planting.

Better Crops WITH PLANT FOOD

The Whole Truth—Not Selected Truth

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THE HUNGRY PICKER

Better Crops with PLANT FOOD

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VOL. XLIII WASHINGTON, D. C., MAY-JUNE 1959 No. 3

FOR EVERYONE . . .

BOOK SHELVES

Jeff McDermid

(ELWOOD R. MCINTYRE)

THANKS be to the thoughtful person who brought in the town's custom photographer to take a picture during a rush hour at our small, crowded free public library over 40 years ago. Seated at the recording desk and almost hidden by the press of eager youngsters was the patient white-haired librarian, busy taking in and letting out the books of personal choice or class assignment.

She was our first full-time paid librarian. Her husband was the principal of the high school. She was one of those natural aristocrats in the realm of heart, hand, and home. She was calm, dignified, and directing, always respected and able to keep things orderly and quiet. She accomplished this by getting our young patrons to regard the little library as the precious property of us all.

Things laid away in the lumber room of old, half-finished projects return again revealed by the flash powder's lightning, fired so long ago. Back there in the shadows above the shelf-lined walls are dimly seen the framed outlines of Whittier, Longfellow, Poe, Dickens, and Lincoln . . . the drapery of dusty flags . . . the calendar for 1905 up there near the weather bulletin . . . and the Greek and Roman classic plaster casts, put up perhaps in hopes that some of us might find these noble ancients quite worthy of a small town student's quest.

As the only possible public source of reference for the pros and cons on popular current topics, our library remained open four evenings

a week. Here we came for the affirmative and negative arguments, used over and over in our high school debates.

It was hard to squeeze much more juice out of the dehydrated topics that Prof. Hough assigned—like woman's suffrage, foreign immigration, the income tax, and that "the farmer contributes more and gets less for his labor and investment than any other class of citizens." (Arguments for the last one came easy in a rural town.)

After he announced who were to joust in the forensic fray and the sides to be taken, we clutched at the references from Prof's weighty list and rushed down to copy our telling arguments at the library. I think the volumes of the *North American Review* were most used, but *Harpers, The Literary Digest,* and *The Review of Reviews* were much dog-eared by debaters in search of devastating ammunition. Judges gave up many pleasant evenings at home or at the lodge to sit through two hours of callow commentary. They, like the good librarian, did more for youth in the early Twentieth Century than any of their neighbors realized.

One of the best friends of the country library has said, in presenting a series of rare pictures of their beginnings: "First comes the satisfaction of a deep human hunger, the effort to get a few shelves put up and a few books to start with, in almost any available space . . . the principle of freedom of access, the freedom from censorship . . . the published record of all sides of any question."

This indeed was true about the small library of my youth. Though it counted its volumes in a few hundred, then a few thousand, yet nobody was discriminated against on the grounds of politics, religion, race, or nationality. If any of our city dads ever tried to censor the book contents, it was short-lived and seldom repeated. Today they can use natural terms in all counseling books for teenagers, and the most intimate topics are so plainly discussed in print that a censor at the library might kill one bird there but leave many more unmolested in the book stores and news stands.

Agitation for a circulating library in our Midwest town began in the late 1890's. It was not to be a very large place, since the ladies who belonged to the promoting group well knew that fund raising or action by the thrifty common counsel would be modest at most.

Back before this, we had enjoyed borrowing books at the corner drugstore, where a woman of taste and some means had set up shop three days a week. Books cost 10 cents for a week's perusal. Mother was especially tickled about Miss Morgan's books covered with heavy wrapping paper. Her first few months were spent reading that almost forgotton series of New England homespun experiences authored by "Josiah Allen's Wife" (Marietta Holley). Josiah and Samantha and the Palmer Cox brownies were my favorite fiction characters before my chum and I learned to follow Henty's wondrous historical novels and the doings of the fellows in Thomas Bailey Aldrich stories. Oh, yes, and we can't forget the great woods lore of Ernest Thompson Seton.

Finally, our city library found a haven above a store on Main street. Here it made a rather cramped impact on the town's culture until the new city hall of red brick was finished. Then the councilmen reserved a

fair-sized room on the second floor of the city hall to make our book collection safe and accessible. I guess it's there today.

Our library books had to be sewed and patched over several times. When they at last wore out, that was good, because, as the same writer I quoted before says, "They wore out in the cause of usefulness." Save for an accidental rip or water soaking, the books took their beatings honestly for what long hours they enjoyed, bringing joy, wisdom, knowledge, and romance into the swift current of children's lives.

And again the same library authority added a bit more to the background we remember about our public pool of books:

"While the old-time small town public library rarely had style, those readers, young and old, who became habitual frequenters developed a fondness for certain of the homely details of the place, just as old school rooms can be warm and rich in memory. . . and this in spite of hard chairs, bare floors, glaring raw light bulbs, frayed leatherette on tables and desk tops . . . the stove with a certain spot scratched by matches as smokers left the library . . . and the inevitable works of art grown standard and familiar from constant exposure in public places."

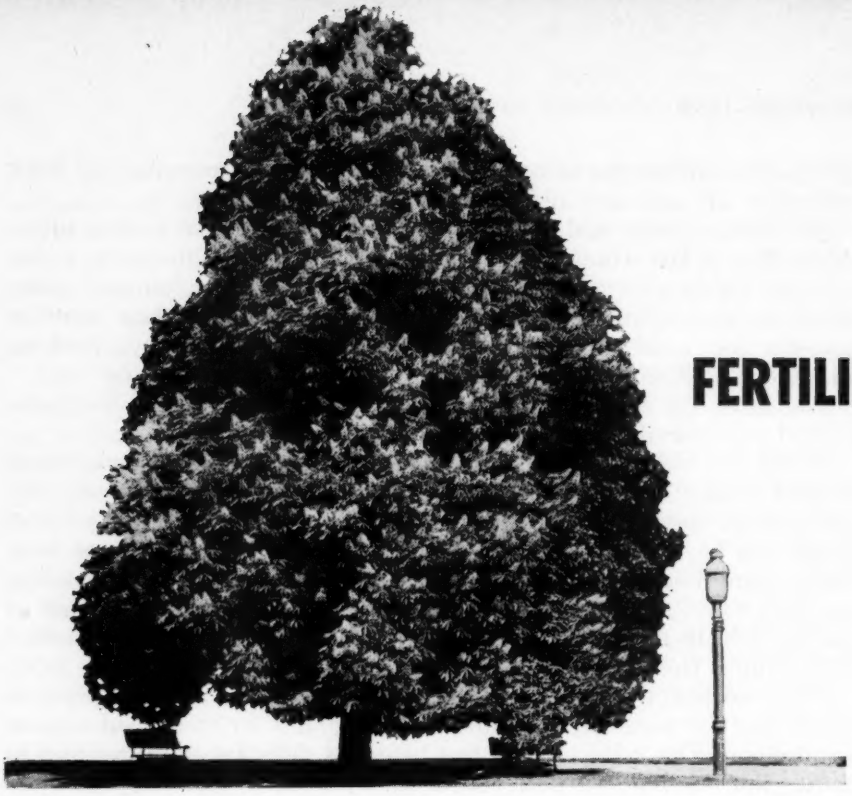
Those bookish treasure troves that came to us like a cargo of precious jewels and old wine left a peculiar lasting quality to all our subsequent sojournings. The Bible we had had before as daily family sustenance of spirit. But our library's part was to show us the divinity and devotion that was man at his best.

We little knew in those adolescent years that something special had come to us out of the meager means of a recently settled local community. Devoid of most books except the Bible and the hymnal, these self-reliant, confident, and daring dreamers made history themselves and let their grandchildren read and write about it long after.

Catering to the reading habits of small towners and ruralites are a growing number of libraries serving the countryside. Office of Education figures for 1950 are striking. Of 6,028 library systems reporting, only 180 served populations over 100,000, but *2,524 systems served groups under 1,000 and from 1,000 to 2,500.* It's nice to know that there are 524 county libraries, 322 school district libraries, and 280 of the township type.

They tell me that libraries—which have their units of support restricted to a city, town, or village—serve the most persons, *or an estimated 66.5 million readers,* which is 58 percent of all. Then those that get support from a wider basis—county, regional, city-town and city-county libraries—are said to reach 41 million or 36 percent of the total. Last mentioned is the school district type. This kind of library reaches about five million people, or six percent.

But figures are useful only if one realizes what our isolated country places were before they *planed planks into shelves* for the new era of book learning and "borrowed' culture. For most of us, it was and still remains the answer to many questions and the source of solace in weary, despondent hours. **THE END**



FERTILIZING YO

By Wesley P. Judkins **Department of Horticulture Vir**

FINE trees are essential to a well landscaped home. They frame and enhance the beauty of your house and shade it from the sun during the long summer months.

You should maintain the trees around your home in a vigorous, healthy condition if you want them to fulfill their purpose. Their foliage must be an attractive deep green color, and there should be adequate *but not excessive* growth of branches and twigs.

To insure this desirable rate and type of growth, the trees must be carefully planted in a suitable soil and periodically fertilized.

GOOD SOIL IS IMPORTANT

Your soil should have good natural drainage to a depth of *at least two feet,* preferably deeper. Shade trees grow poorly—and may die prematurely—when planted on heavy soils with inadequate drainage.

If the site is low and water is likely to collect around the roots, place a layer of rocks or a tile drain under the tree when it is planted. Unfortunately, this may only partly correct the condition because a heavy soil will still lack the necessary aeration to promote vigorous healthy growth of roots.

In addition to being well-drained, the soil in which your shade trees are planted should supply adequate water and fertilizer elements for the roots.

A deep loam of medium texture is ideal. Such a soil will usually provide enough moisture during the summer unless a severe drouth occurs. A loam is well aerated and has a good reserve capacity for plant foods.

Sandy soils are less fertile than loams or heavy soils. They have a low water-holding capacity which may seriously reduce growth rate during drouth periods.

NOUR SHADE AND FLOWERING TREES

ure Virginia Polytechnic Institute

Evergreen trees prefer a light soil with good drainage and aeration, while *deciduous* trees grow better on a somewhat heavier soil.

A mulch may be used over the root zone of trees which have branches all the way to the ground. A two-inch layer of sawdust, shavings, or peat will conserve soil moisture and tend to reduce the growth of competing grass and weeds. A well-kept lawn is more attractive than mulch around trees whose lowest branches are located several feet above the ground.

THE NEED OF FERTILIZER

Nitrogen is an important fertilizer material for your trees. Use about *one pound* of nitrate of soda or ANL on most soils *for each inch of diameter of the tree trunk, measured one foot above the ground.*

The actual amount to use must be adjusted to the soil type and the needs of the individual tree. More fertilizer may be needed on light soils and less on heavy soils.

The best way to determine how much fertilizer your trees need is to observe the color of the leaves. If they are light green or yellow-green, use more fertilizer. If they are dark green, reduce the application or leave it off entirely for a year or two, as long as the trees continue to make satisfactory growth.

Trees making excessively vigorous growth will be less attractive, are susceptible to injury by cold in winter, and usually will have a shorter life. So, don't use too much fertilizer.

Dr. Wesley P. Judkins is Chairman of the Horticulture Department at Virginia Polytechnic Institute. He earned his B.S. from Maine, his M.S. and Ph.D. from Ohio State. He has held research and teaching positions at Maine, Connecticut, New Mexico, Ohio State, and VPI.

A complete fertilizer, *such as 10-10-10,* is recommended (1) on light infertile soils and (2) for trees that are making poor growth and show signs of nutrient deficiency. Use about *two pounds for each inch of diameter of the trunk, measured one foot above the ground.* As with the nitrogen fertilizer, increase or decrease the amounts depending on the apparent needs of the trees. *Evergreens* usually require less fertilizer than *deciduous* trees.

The potash of your complete fertilizer—the last "10" in the 10-10-*10* analysis—*is particularly beneficial for trees on infertile soils, such as the soils in the Atlantic Coast states.*

Iron deficiency has also been a problem in certain areas. This is evident as a yellowing of the leaf between the veins. You may correct this problem by using a mixture of equal parts of iron sulfate and sulfur at the rate of one pound per inch of diameter of the tree trunk.

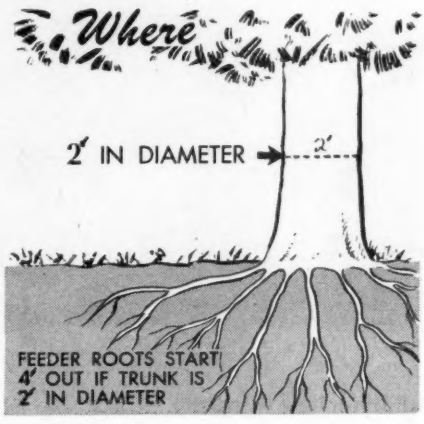
APPLYING YOUR FERTILIZER

States south of Pennsylvania and Iowa in fall . . . states above (including Iowa and Penn.) in spring.

As a general rule, in states south of Pennsylvania and Iowa, *the fertilizer should be applied in the fall within one month after the average date of the first killing frost.*

In the northern states, *the fertilizer should be applied in the spring about one month before the average date of the last killing frost.* A fall application in the *northern states* may cause the trees to be more susceptible to winter injury.

Spring is the preferred time for fertilizing evergreens in all areas.

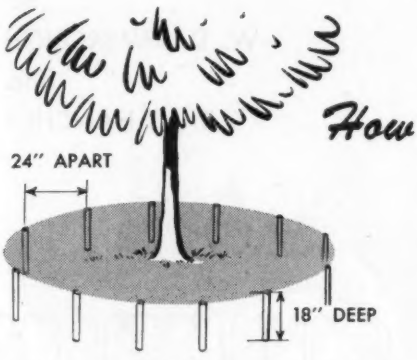


Most feeder roots are in the top foot or two of soil . . . no nearer trunk than *twice* distance of its diameter . . . and out just beyond the branches.

The greatest concentration of roots that absorb fertilizer materials and water for the trees are located in a band starting near the trunk and extending out just beyond the ends of the branches.

Actually, very few absorbing roots are found nearer the trunk than a distance equal to about twice its diameter. Most of the feeder roots of the tree occur in the top foot of soil. Very few are found below the two-foot depth.

The fertilizer should be applied to the area of greatest root concentration if it is to be most beneficial to the tree.



Either broadcast on soil surface under tree branches . . . or apply in holes 18" deep and 24" apart in area of greatest root concentration.

Nitrogen fertilizer is readily soluble in water and may be broadcast on the surface of the soil under the branches of the tree. Rain or sprinkler irrigation will cause it to move down to the rooting zone.

The phosphoric acid and potash of the *complete* fertilizer do not move readily through the soil in a soluble form as nitrogen does.

On a *sandy soil,* these materials may penetrate sufficiently to reach the roots and nourish the tree.

On *heavier soils,* the *complete* fertilizer should be placed in the ground under the tree. The best procedure is to make *holes* with a punch bar when the soil is moist after a period of rain or sprinkler irrigation. *The holes should be about 18 inches deep and 24 inches apart scattered evenly over the area of greatest root concentration.*

The fertilizer should be mixed with about 3 or 4 times its volume of soil and poured into the holes to within *about 4 inches of the top.* Water may be used to cause the fertilizer to move out into the soil. The top portion of the holes should be filled with rich garden loam.

FLOWERING APPLE, CHERRY, AND PEACH TREES

You can fertilize your flowering crab apple, cherry, and peach trees in much the same way as your shade trees, although you may need less fertilizer. About one-half pound of nitrate of soda or ANL should be used for each inch of trunk diameter one foot above the ground.

You should maintain sufficient vigor on your flowering trees to develop 12 to 15-inch shoots each year. If you encourage longer, more vigorous growth, your trees will produce fewer flowers. On light sandy soils, use a complete fertilizer, *such as 10-10-10,* at about one pound for each inch of trunk diameter for best results.

ITEMS TO REMEMBER

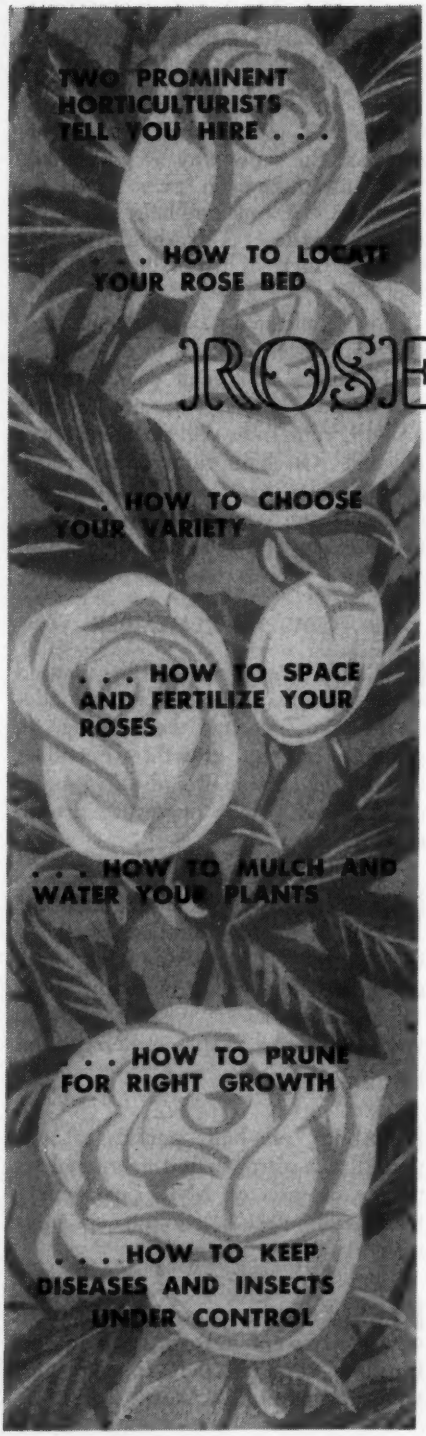
1 Shade trees should be planted on well-drained soils that receive adequate water during the summer to promote healthy growth. Fertilizer will not overcome the disadvantages of heavy wet soils or severe drouth conditions.

2 Do not use too much fertilizer! But apply *enough* fertilizer to keep the leaves of your shade trees dark green in color and to maintain about 12 to 15 inches of shoot growth on your flowering apple, cherry, and peach trees.

3 About one-half pound to one pound of a nitrogen fertilizer, such as nitrate of soda or ANL, per inch of trunk diameter is enough on most soils.

4 On infertile or sandy soils about one to two pounds of a complete fertilizer, *such as 10-10-10,* may give you better results.

THE END


TWO PROMINENT HORTICULTURISTS TELL YOU HERE . . .
. . . HOW TO LOCATE YOUR ROSE BED
. . . HOW TO CHOOSE YOUR VARIETY
. . . HOW TO SPACE AND FERTILIZE YOUR ROSES
. . . HOW TO MULCH AND WATER YOUR PLANTS
. . . HOW TO PRUNE FOR RIGHT GROWTH
. . . HOW TO KEEP DISEASES AND INSECTS UNDER CONTROL

BY
W. D. KIMBROUGH
and
R. H. HANCHEY

ROSE CULTURE

LOUISIANA
STATE
UNIVERSITY

The rose is the most universally popular flower. If you give it proper care, it can be grown in most areas of the country. But to grow roses successfully, you must meet certain requirements.

CONSIDER LOCATION, SOIL, PLANT

1 Consider the location of your rose bed. It should be as fully exposed to the sun as possible. Good drainage is essential. This does not mean merely surface run off, but location in an area where water will percolate through the soil and roots will not be in waterlogged soil.

If the drainage is not too good, raise the bed some. A sandy or silt loam underlain with porous clay subsoil is good. Prepare your rose bed well in advance of planting time. Work some organic matter into the soil when preparing your rose bed.

There are many varieties of roses. Some are grown mostly for cut flowers. Others more for show on the bushes. The Queen Elizabeth variety, under observation above, is a beautiful pink rose for bush show, highly recommended for those who may think they are interested only in the cut-flower type.

2 Your soil pH (how acid or how alkaline) is usually important since it may affect the availability of essential elements your plants obtain from the soil. The type of soil, its organic matter content, etc., will also affect this. So a "best" soil pH cannot be given for roses, since they are grown successfully over a wide range of soil pH. *A soil pH of 6 should be satisfactory under most conditions.*

3 Use only good plants. Two-year-old, No. 1 grade, field grown plants are good. Be sure they are free of disease.

4 Time of setting is important. The best time will vary in different areas but should be done during the dormant season and not too near the time for growth to start. Transplanting should be done only when the soil is in *good working condition. It should not be muddy.*

CHOOSE YOUR VARIETY CAREFULLY

Although there are many varieties of roses, most growers will be limited to a select few. The variety you select may largely determine the success you have with roses.

Preferences vary, of course. But if you're just starting, you'd be wise to plant at first only varieties known to do well.

Roses are divided into several classes. The *hybrid teas* are the most popular class, but there is an increasing interest in *floribundas.* The former are grown mostly for cut flowers, while the latter are grown more for show on the bushes.

The new *grandiflora class* has only

Dr. W. D. Kimbrough is Professor of Horticulture at Louisiana State University and in charge of the ornamental research program of the Louisiana Agricultural Experiment Station. He trained at Alabama Polytechnic Institute and University of Maryland where he earned his Ph.D. Has been co-author with Dr. Hanchey on several studies relating to various ornamental plants.

a limited number of varieties but they are all very good ones. *Queen Elizabeth* of this group is a beautiful pink highly recommended even for those that may think they are interested only in hybrid tea roses.

The following varieties of *hybrid tea roses* are generally satisfactory:

- *Red*—Red Radiance, Crimson Glory, Chrysler Imperial, Nocturne, and Aztec.
- *Rose*—Charlotte Armstrong and Rubaiyat.
- *Pink*—Pink Radiance, Picture, Capistrano, Pink Lustre, and Tiffany.
- *Blends*—Peace, Helen Traubel, Sutters Gold, Countess Vandal, and Girona.
- *Yellow*—Eclipse, and Masterpiece.
- *White*—(whites are recommended with reservation) Virgo, Caledonia, and K. A. Victoria.

The following *floribunda varieties* are good: Embers, Spartan, Siren, Frolic, Lilibet, Vogue, Fashion, Pinocchio, Golden Fleece, Summer Snow and Ivory Fashion.

You can get climbing types of many of the above bush varieties, as well as some varieties that are only climbers.

New rose varieties are being introduced every year. But it usually takes a few years to determine whether a new variety is worthwhile or not. Many varieties other than those listed may grow very satisfactorily for you.

Roses need space in which to grow, so don't crowd them. They should not be spaced closer than *three feet in the row* and *four to six feet* should be kept *between rows.*

HOW TO FERTILIZE ROSES

Rose plants secure certain elements from the soil, which are essential for the growth and the well being of the plant. Many soils are deficient in some of these elements and for this reason it is usually necessary to add fertilizer to the soil in which your plants are growing.

Any commercial 8-8-8 fertilizer is good for the home gardener to use in growing roses. Apply one-eighth to one-half pound of 8-8-8 fertilizer per plant, depending on size. Broadcast it in a circular area extending from about six inches from the crown of the plant to eighteen inches, again depending on plant size. Apply your fertilizer in late winter. On *good* soil, about ⅛ pound of nitrate of soda per plant in August is sufficient. On *poorer* soils, two to three applications of *complete* fertilizer will benefit.

Applications of fertilizer at monthly intervals on plants grown in the open are unnecessary and might even be injurious. It is probably safer not to apply any commercial fertilizer in the hole when the rose bush is set out.

When you can obtain manure, use some in your rose growing. When you cannot obtain it, some other source of organic matter might be beneficial.

MULCH HELPFUL—BUT NOT ESSENTIAL

Some form of mulch material applied at a depth of about 2-3 *inches* is often helpful but not essential. The mulch helps control weeds and con-

serve moisture. Pine straw or oak leaves make a good mulch. Don't use materials that tend to pack, like peat moss or sawdust. Remember some materials use nitrogen in decomposing.

Don't let your rose plants be injured by inadequate water. Lack of water will limit growth of plants and cause other good cultural practices, such as fertilization, *not* to give the results they should. During periods of drouth, your rose bed should be well watered at intervals of *about a week.*

PRUNE FOR RIGHT GROWTH

If you want your rose plants to grow well, learn to prune them right. The main pruning should be done *from mid to late winter.*

In the South, the pruning time helps determine the time of the first bloom in the spring. Generally, the earlier you prune the earlier your roses bloom. But remember: if blooms are too early, they may be damaged by a late freeze.

Plants of some of the more vigorous varieties may be pruned back to *12-15 inches,* but those of many varieties should be pruned back to *only 18 to 20 inches.* Do not prune plants of the Peace variety too severely. In many parts of the South, another pruning is usually necessary in August. The plants tend to get tall and sprangly and should be cut back to from *24 to 30 inches.* This improves the flowers in October and November.

Cutting flowers is also a form of pruning, often affecting the amount of pruning necessary. Most hybrid tea roses are grown for cut flowers. But don't overcut the blooms. That can severely dwarf the plant.

The leaves are largely the food manufacturing area of the plant, so retain sufficient leaves to make normal growth possible. This is especially important on young plants. All too often most of the leaves on small plants are removed when flowers are cut, making it impossible for the plant to grow. Remove all flowers that have not been cut from the plant when they wither and before seed is set.

Dr. R. H. Hanchey is Professor of Horticulture at Louisiana State University. He earned his B.S. from Southwestern Institute, his M.S. from LSU, and his Ph.D. from Ohio State University. Has been co-author with Dr. W. D. Kimbrough on several studies relating to various ornamental plants.

KEEP DISEASES AND INSECTS UNDER CONTROL

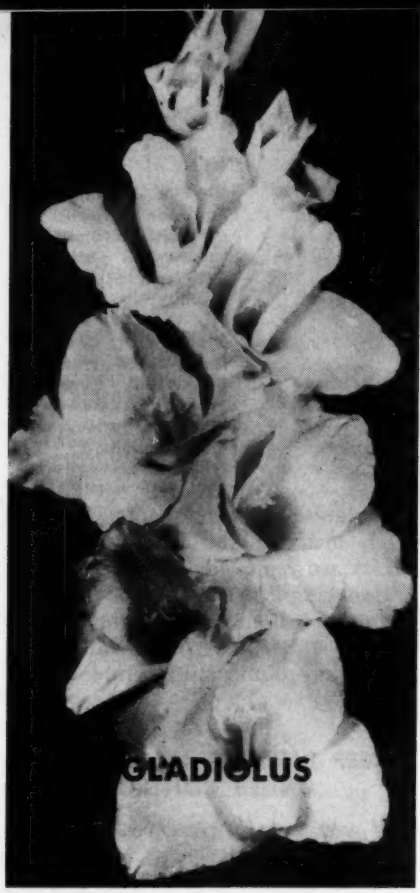
If you are to grow roses successfully, you must keep insects and diseases under control. This requires spraying or dusting. Spraying, which is usually more effective, is more difficult than dusting. But dusting takes more material.

To control black spot in humid areas in the South, spray or dust regularly—*once a week or oftener.* Black spot probably causes more failures with roses than anything else. Other good cultural practices benefit little if black spot is allowed to defoliate the plants.

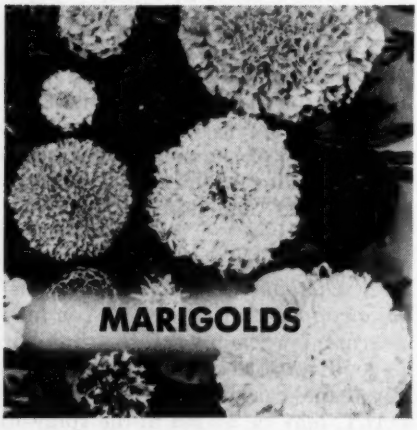
A number of commercial spray and dust mixtures on the market will control diseases and insects, including black spot.

Some of these are: *Phaltan, Manzate, Diathane Z 78, Captan, Tribasic copper,* and *Fermate.* You may also use Bordeaux mixture. Sulphur is good for black spot and mildew. Karathane can be used for mildew. D.D.T. may be added to the spray to control chewing insects and malathion to control aphids and spider mites.

THE END



The gladiolus has become one of the most popular cut flowers among the bulbs—a high user of potash and phosphorus. Its bulb, called a corm, can be planted at 2-week intervals for a summer-long supply of cut flowers. Grow glads in rows for easy cultivation.



Marigolds are one of our most popular, colorful annuals—easily grown. Thanks to plant breeders, today's marigolds have a wide range of colors, sizes, and forms.

ORNAMENTALS FLOURISH WITH GOOD FE

By
Henry J. Smith

Mississippi
State
University

THE key to a well-landscaped home lies in the *close cultivation of plants.* All too often, we think more about selecting landscape plants than about training them. In addition to trees and shrubs, annuals and perennials are necessary for a well-planned yard.

HOW TO SET SMALL TREES

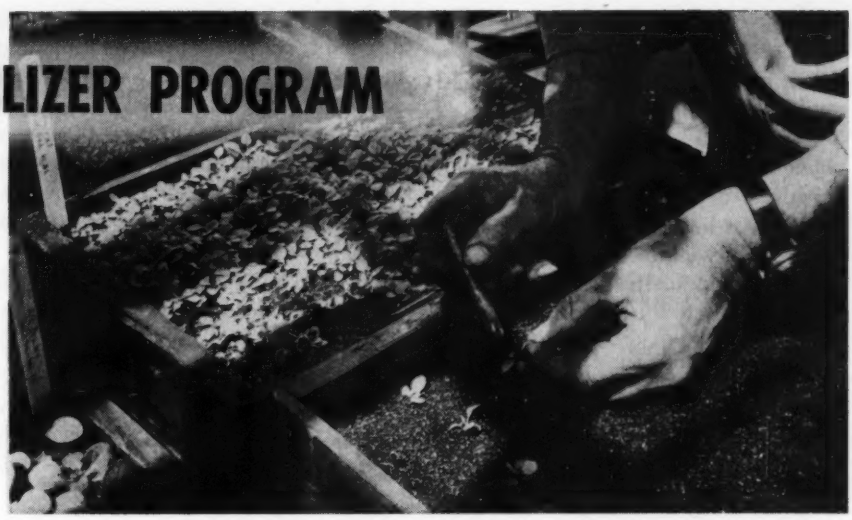
A general rule in setting small trees is to fill around the roots with a good compost-soil mixture or a loamy topsoil. Mix with this some well-rotted manure or peat moss. If the soil is heavy, use sand for about one-fourth of this mixture.

A complete fertilizer (as 6-8-8) should be mixed in the hole at the rate of 2 pounds per inch in diameter of tree trunk. Superphosphate can be used at a rate of 5 pounds per inch in diameter of tree trunk.

FEEDING YOUR SHRUBS

Most shrubs do well when fertilized

D FERTILIZER PROGRAM



Annual flowers can be started indoors from seed, broadcast in a flat or shallow box. When plants have strong true leaves, transplant to rows. These will give earlier blooms when set outside after danger of frost.

with a 6-8-8 or a similar complete fertilizer. Use 2 to 5 pounds of fertilizer per 100 square feet of bed area, applied in spring.

Broadleaf evergreens are better if the application is divided, half in the *early spring* and half *after plants flower.*

Apply cottonseed meal or soybean meal to supply nitrogen to small evergreens. Use about 4 pounds per 100 square feet. After applying, *always water-in fertilizer.*

On all *single specimen* green shrubs, use one-half to one pound of commercial fertilizer per plant.

ANNUALS—QUICK ROUTE TO COLORFUL LANDSCAPE

Annual flowers grown from seeds are the quickest route to a colorful display in the landscape. They're especially useful at the new home, until permanent shrubs are set.

Any good garden soil will produce satisfactory annuals. They are quick-growing plants that require a fertile soil which will not dry out too rapidly, yet is well-drained.

Annuals are very useful for seasonal display at the base of shrubs—either shrubbery borders and hedges or foundation shrubs. *Cut-beds of annuals often are placed in the vegetable garden.*

Extremely poor soil must be built up to grow good annuals. Animal manures and materials such as cotton-

Henry J. Smith is assistant horticulturist in charge of landscaping for the Mississippi Agricultural Extension Service. His specialty is farm home landscape. He earned his B.S.A. and M.S. at the University of Florida. He has written numerous bulletins and articles on ornamental horticulture, a field in which he is widely known.

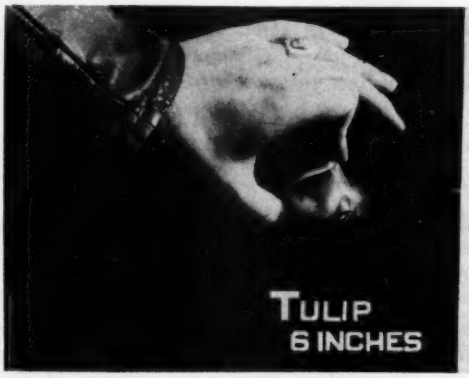
seed meal and bonemeal are good for modifying soil texture.

But extremely poor soil needs *more readily available fertilizers,* such as 5-10-5 mixture, applied at the rate of about 1½ pounds per 100 square feet. Broadcast over soil and work in thoroughly just before planting. About 2 inches of well-decayed manure or other organic matter can be spaded into the bed to further improve soil.

Some of the more popular annual flowers that provide colors and forms to fit any landscape are listed with this article. Look the list over. See when to plant, as well as facts about sun or shade, height, and spacing between plants.

An annual early-spring feeding will do much to promote a healthy and heavy growth each season. Beds of perennials are "at home" in front of shrubbery borders. There they present a colorful display against the background of shrubs. Like annuals, they are out of place in beds on the open lawn.

If you have heavy clay or light sandy soil, work in humus in the form of peat moss, compost, or muck. Common sand will help clay soil to better drainage. *Many perennials have fleshy crowns and roots that rot easily in damp soil.*



Have you ever wondered how deep to plant your bulbs? Here are suggestions for some popular flowers. A general rule is to cover the bulb in soil

PERENNIALS—FOR BLOOMS YEAR AFTER YEAR

Perennials are often called the "lazy man's flower" because they produce blooms year after year. Soils must have enough fertilizer to support good growth from year to year. Mixing a well-balanced commercial fertilizer into the soil just before planting time is very helpful.

There are many popular perennials grown—*Shasta daisies, Daylilies, Iris, Yarrow, Peony, Thrift, Viola, Gaillardia, Hardy Salvia, Mallows, False Dragonhead, Hardy Phlox,* and many others.

Canterbury Bells and Foxglove are usually listed as perennials, but they are *true biennials* which live only two years, making growth the first and flowering the second.

Every three or four years you should dig and divide perennials. This

keeps the growth active and produces more and better flowers. Separate in fall or early spring months.

In preparing a bed for perennials, you should work in 3 to 4 pounds per 100 square feet of 6-8-8. Or use about 6 to 8 pounds of superphosphate.

About two inches of well-decayed manure or other organic matter should be spaded into the soil at the same time. A spring application of 6-8-8 *—about 4 pounds 6-8-8 per 100 square feet of perennial bed*—will stimulate good growth and bloom. This can be *repeated in late May or June.*

When you prepare the soil, incorporate 3 to 4 pounds per 100 square feet of 4-12-12 or 5-10-5. Superphosphate, 4 to 5 pounds per 100 square feet, may be substituted.

Early in the spring, give iris plantings an application of about 1 to 2 pounds per 100 square feet of 5-10-5. When plants have finished blooming, apply 2 to 3 pounds per 100 square feet of 4-12-12. Other spring-flowering bulbs, such as tulips, hyacinths, daffodils, narcissi, and crocus, need only the early spring application of 5-10-5.

When dahlias are about one foot high, apply about 2 ounces per plant

at depth 2 to 3 times diameter of bulb. Plant deeper in very sandy soil—not so deep in heavy clay.

Annuals and perennials should be planted with the taller growing ones in the background. This makes for a good display where all blooms can be seen.

BULBS, TUBEROUS-ROOTED PLANTS USE HIGH POTASH AND PHOSPHORUS

Bulbs and tuberous-rooted plants appreciate a fertilizer which is *high in phosphorus and potassium.* Good drainage is essential to such flowers. of 6-8-8. If the foliage is yellow, indicating a hunger for nitrogen, apply nitrogenous fertilizer at the rate of one ounce to 2 gallons of water for each 12 square feet of bed. Ammonium sulfate is an example of such.

Before planting gladiolus, apply superphosphate at the rate of 5 pounds per 100 feet of row. Place in furrow and cover before planting corms. When plants are 8 to 10 inches high, apply 5-10-5, 6-8-8, or 9-12-12 at the rate of 2 pounds per 100 feet of row.

THE END

ANNUAL FLOWERS FOR HOME GARDENS

Common name	When to plant seed[1]	Sun or shade	Height	Spacing between plants
			Inches	Inches
Ageratum	A, B	Sun	6–20	10–12
Babysbreath	A, B	Sun	12–18	10–12
Balsam	A, B, D	Sun	20–28	12–14
Calendula	A, B, D	Sun	14–18	8–10
Calliopsis	A, B, D	Sun	18–24	10–14
Candytuft	A, B, C	Sun	9–12	8–12
China-aster	A, B	Sun	12–24	10–12
Clarkia	A, B, D	Partial shade	18–24	10–12
Cockscomb	A, B	Sun	16–40	10–12
Cornflower	B, C, D	Partial shade	16–30	12–14
Cosmos	A, B, D	Sun	30–48	10–12
Dahlia	A, B	Sun	18–40	12–14
Forget-me-not	B, C	Partial shade	8–12	10–12
Four-o'clock	A, B, D	Sun	20–24	12–14
Gaillardia	A, B, C, D	Sun	12–18	10–12
Globe-amaranth	A, B	Sun	18–24	10–12
Godetia	A, B, C	Partial shade	18–24	12–14
Larkspur	A, C, D	Sun	18–48	6–8
Lupine	A, B	Sun	18–24	6–8
Marigold	A, B	Sun	6–24	10–14
			Feet	
Morning Glory	A, B	Sun	8–12	24–36
			Inches	
Nasturtium	A, B	Sun	12	8–12
Pansy	A, C	Sun & partial shade	6–10	6– 8
Petunia	A, D	Sun	8–24	12–14
Phlox	A, B	Sun	6–12	6– 8
Pink	A, B, D	Sun	6–16	8–12
Poppy	A, C, D	Sun	12–16	6–10
Portulaca	A, B, D	Sun	6– 9	10–12
Rudbeckia	A, B	Sun & partial shade	20–24	10–14
Salpiglossis	A, B	Sun	24–30	10–12
Scabiosa	A, B	Sun	18–36	12–14
Scarlet Sage	A, B	Sun	14–36	8–12
Snapdragon	A, B, D	Sun	10–36	6–10
Spider plant	A, B, D	Sun	30–36	12–14
Stock	A, B	Sun	24–30	6–10
Straw Flower	A, B	Sun	30–40	8–10
			Feet	
Sunflower	A, B	Sun	4– 7	12–14
			Inches	
Sweet Alyssum	A, B, C, D	Sun	6–10	10–12
			Feet	
Sweet Pea	A, B, C, D	Sun	4– 8	6– 8
			Inches	
Verbena	A, B	Sun	9–12	18–24
Zinnia	A, B	Sun	18–36	8–12

[1] When to plant seed:

A—In frames or flats indoors for early flowering.
B—Outdoors after last frost for later blooming.
C—Late summer to early fall.
D—Late fall.

YOU CAN GROW A GOOD LAWN—TOO!

Here's a new Potash Institute handbook on *lawns*—suggesting to you what grass to plant, how to determine your lime and fertilizer needs, facts about fertilizer and lime, how to fertilize for top quality lawns, some basic steps to a good lawn, some tips on good lawn management. (32 Pages with 4-color cover)

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Young Farmers Top 200 Bushels Per Acre

Lindon Ratliff
226 bushels per acre

Henry Walker
233 bushels per acre

John Shepherd
202 bushels per acre

Four high school boys harvest 200-bushel yields from their corn projects

. . . all make state or national high yields

. . . all use Funk's G-Hybrids

Four young farmers produced record corn yields on their 4-H and FFA corn projects in 1957 and '58. Best known of the 200-bushel growers is Lindon Ratliff of Baldwyn, Mississippi, who harvested 226.99 bushels in 1958. This was from the same measured acre where his brother, Lamar, produced the all-time high yield of 304 bushels per acre in 1955. Lindon harvested the national high yield of 250.85 bushels per acre in 1957. Both Ratliffs used the famous hybrid, Funk's G-711.

An Illinois 200-bushel grower was John Shepherd of Tolono, who harvested 202 bushels *in the crib*. Young Shepherd picked his two acre project field of Funk's G-95A, and only after he had weighed it over the scales did he discover his phenomenal yield.

The highest yield of corn reported in the United States in 1958 was made by 14-year-old Henry Walker of Sulphur Springs, Tennessee. His 4-H Club corn project checked out at 233 bushels per acre. The hybrid was Funk's G-711.

Sixteen-year-old Mack Patterson of Buckhorn, Alabama, was 1958 state winner in the Alabama "Champion Corn Growing Contest" with a 223-bushel yield from his supervised corn project. Again the hybrid was Funk's G-711.

The Producers of Funk's G-Hybrids congratulate these young men for their outstanding corn growing achievements.

The objective of the Funk's G-Hybrid Organization is to provide corn growers with hybrids of the highest yield potential. G-Hybrid dealers are in every corn growing area of the United States to help select the best hybrids for each farmer's needs.

THE PRODUCERS OF FUNK'S G-HYBRIDS

Midget Auto Owner: "I want a half-pint of gasoline and a teaspoon of oil, please."

Service Station Attendant: "And shall I cough into the tires, sir?"

"Are you out of your mind, lady," the conductor asked the woman as she started to lead her horse into the sleeping car.

"Certainly not," she said, "he gets sick on buses."

She: Darling, did you ever try to sell vacuum cleaners?

He: No, of course not.

She: Well, you'd better start now —that's my husband coming up the walk.

Do you know where Moscow is located?

Sure, in Russia.

Nope. It's located in the barn beside Pa's cow. *(BAO)*

From an old Arabic saying:

Nothing in the world can take the place of persistence.

Talent will not—nothing is more common than unsuccessful men with talent.

Genius will not—unrewarded genius is almost a proverb.

Education will not—the world is full of educated derelicts.

Persistence and determination alone are omnipotent.

The best way to get real enjoyment out of the garden is to put on a wide straw hat, dress in thin, loose-fitting, unstarched clothes, hold a little trowel in one hand and a cool drink in the other, and tell the man where to dig.

We walked for miles and didn't see a human face.

Where was that?

At a nudist camp.

BIG BUSINESS TERMS EXPLAINED

(Gleaned from Institute Agronomist Munson's Midwest notebook)

To Expedite: To confound confusion with commotion.

Expediter: One who does same while riding fast planes and staying at good hotels.

Efficiency Expert: A guy who trains expediters.

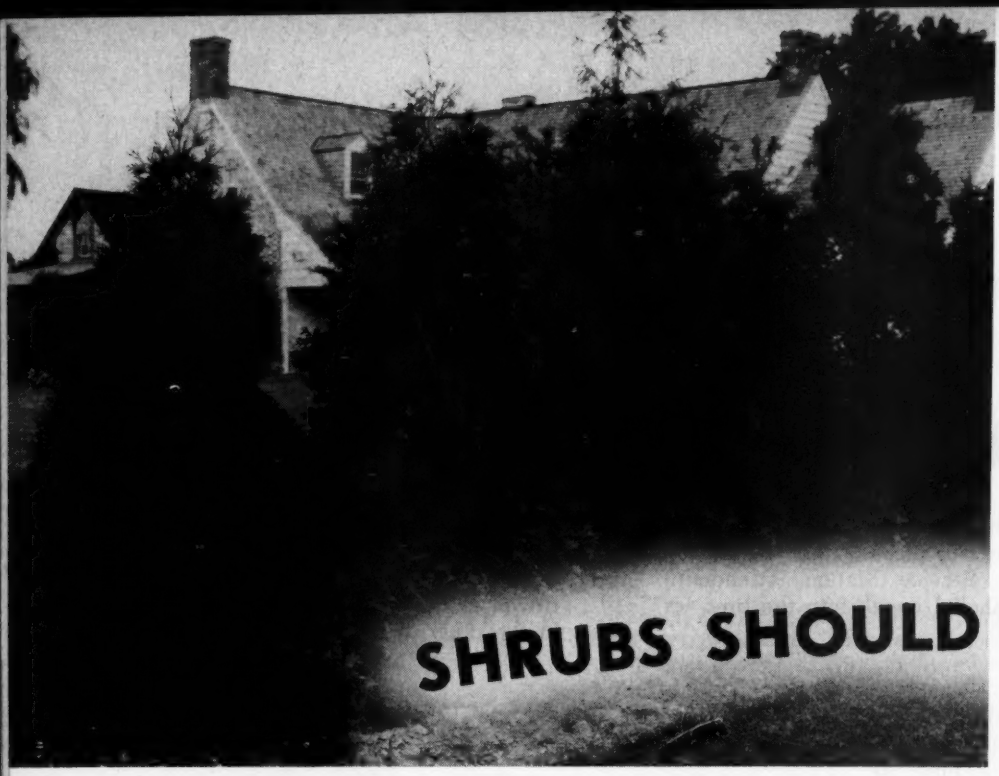
Coordinator: A guy who has a desk between two expediters.

Research: Copying from one book is plagiarism—copying from two books is research.

Economist: A man who tells you what to do with the money you would not have if you had followed his proposals.

Conference: A group of people who individually can do nothing but who can meet collectively and agree that nothing can be done.

Functional Control: You tell him what to do and he'll tell you where to go.



SHRUBS SHOULD BE L

. . . because repeated tests have shown that well-fertilized evergreens retain more leaves during winter and are more winter-hardy than deficient plants.

BY
TOK FURUTA

ALABAMA
POLYTECHNIC INSTITUTE

SINCE nutritional requirements of ornamental shrubs have not been comprehensively studied, there are not many scientific findings.

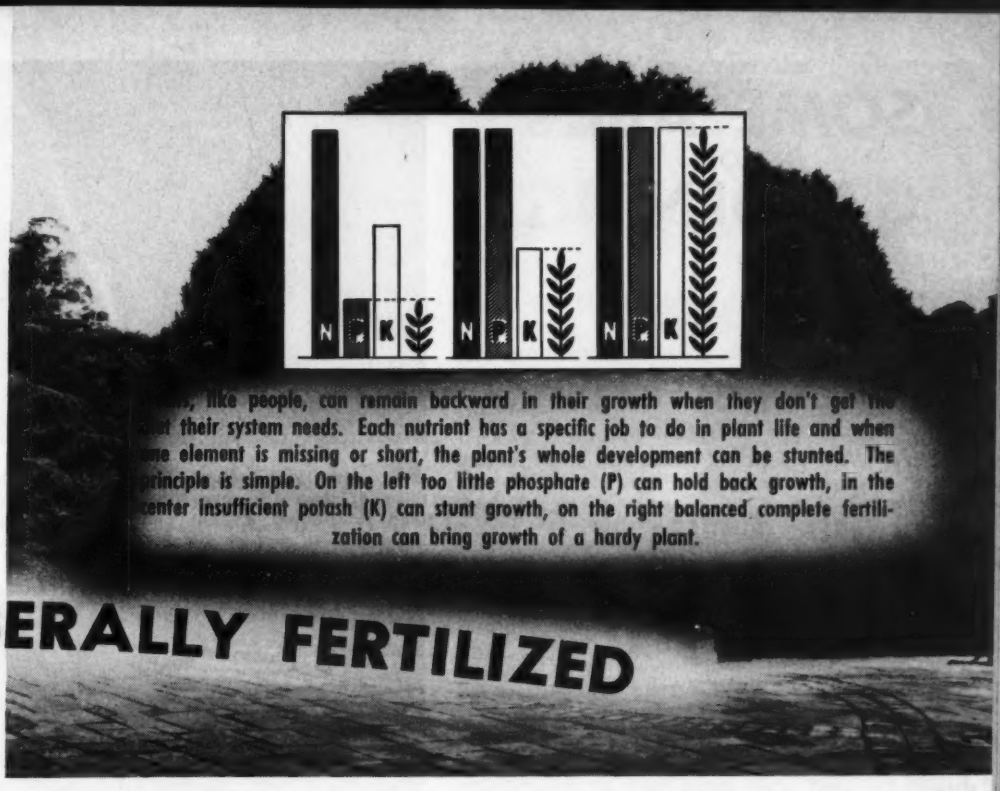
Most recommendations are usually based on various commercial practices. This does not mean the recommendations are invalid. On the contrary, they may rank with recommendations based on experimental work since the practices are based on *the trial and error plus observation type of experimentation.*

The situation and purpose for which your shrubs are being grown is of major concern since this may alter, to some extent, the practice you follow.

For example, shrubs grown for resale would be liberally and more often fertilized than those of mature size in the home yard proportionally to size of plant.

Also, the fact that the plant may be grown in some sort of container means a different fertilization practice. Once you determine your situation and purpose, you can adopt your practices.

The *law of the minimum* applies in considering the influence of fertilizer elements on plant growth. Each element must be present *above a certain minimum amount* for good plant



, like people, can remain backward in their growth when they don't get t... their system needs. Each nutrient has a specific job to do in plant life and when ...e element is missing or short, the plant's whole development can be stunted. The ...rinciple is simple. On the left too little phosphate (P) can hold back growth, in the ...enter insufficient potash (K) can stunt growth, on the right balanced complete fertilization can bring growth of a hardy plant.

E LIBERALLY FERTILIZED

. . . because the law of the minimum applies to shrubs as much as it does to every other plant and crop.

growth. When the level of one is lower than the required minimum, your plant growth is affected. In this last case, good growth is obtained *only when the level of the deficient element is brought up to or above the minimum requirement.* Increasing the level of the other elements does not cause increased growth.

When a fertilizer element becomes deficient in your soil, characteristic symptoms will appear on your plant, indicating this lack.

GETTING AT THE SYMPTOMS

If you are not certain about a nutrient deficiency or an abnormal type of growth, you may get a quick answer with a simple test. After narrowing the possible cause of the symptom to one or a few elements, spray or dip part of your plant in a weak solution containing *only one suspected element.* If the symptoms disappear in a few days, *that* element was deficient in your plant.

Simply because the element is deficient in a plant does not always mean your soil is deficient. It may mean the nutrient is not entering your plant. This may be caused by disease, insects, nematodes, low soil tempera-

(Continued on page 26)

Dr. Tokuji Furuta, Associate Professor of Ornamental Horticulture at Alabama Polytechnic Institute, has directed six research projects and developed five courses in this field. He has published over 50 papers and scientific journals, trade papers, etc. He has been a featured columnist for *Florists Review*, editor of the *Alabama Nurserymen's Bulletin*, secretary-treasurer of the Southern Flower Growers Association.

SOME ABC's OF GARDENING

• *Preparation* includes seedbed, fertilization, seed planting, and transplanting. Broadcast (work in) your fertilizer before seeding or place in rows (bands 3″ from seed) on both sides of seed row. Some suggest broadcasting 30 lbs. 5-20-20 per 1,000 sq. ft. (25 x 40 ft. garden). Watch depth of small and large seed.

CAREFUL PREPARATION

• *Proper care* includes certain "follow through" steps soon after planting. These steps are weeding, thinning, and watering. Weeds fight plants for moisture, light, and plant food. You can eliminate them with a good hoe or cultivator, carefully handled. Chemical weed killers should be used with great care in the home garden. You will get best growth by gradually thinning out the small seedlings in the row. Very thick rows may need thinning two or three times. Most gardens need some artificial water at times. Apply it gently and sufficiently to reach down 8 to 10 inches after seedlings emerge.

PROPER CARE DURING GROWTH

• *Follow-through* planting includes careful attention all summer—not only to weeds, but also to insects and diseases. Use dusters or sprayers that will do the job without too much time and effort. Study pest control before pests start, so you will know what to do at the right time. Most plants need fertilizer while growing—when about half grown. Tomatoes must be kept pruned and tied up. Keep your garden crops planted so certain vegetables will mature successively from spring through summer into autumn. As soon as one vegetable has borne its crop, spade or plow the remains into the soil and plant another vegetable that will mature before cold weather. And proper watering is always important when dry spells hit your garden.

FOLLOW-THROUGH PLANTING

After you prepare a seedbed, broadcast fertilizer or place it in rows (bands) on both sides of the seed row—about 3″ out and 3″ down from seed. Some experts suggest raking in 30 lbs. of 5-20-20 or 50 lbs. 3-12-12 per 1,000 sq. ft.

The common hoe is the best weed controller in the home garden. Keep it sharp. Hoe *shallow* to avoid injuring plant roots. Loosen the surface for absorbing later rainfall. A wheel hoe saves labor in large gardens.

When well started, plants can use more plant food. This gardener applies complete fertilizer in wide ring around tomato plant. Feed your garden in midsummer. Band fertilizer along row 3-4 inches from the plants. *(Pictures courtesy USDA)*

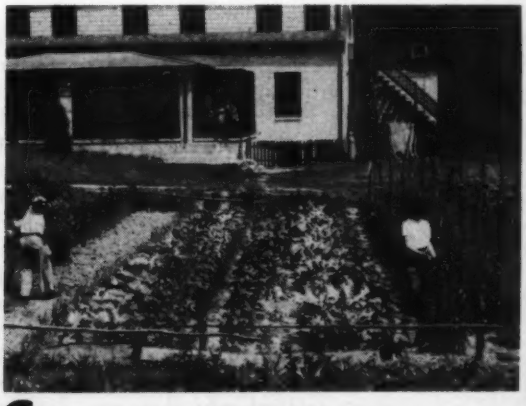
B Small seed—like carrot, lettuce, onion, spinach, kale, turnip—take small trench (above by hoe handle), not covered deeply. Large seed—like peas, beans, sweet corn—take larger trench about 1½ inch deep, covered by rake.

C When you buy tomato, cabbage, and other plants for transplanting, be sure to give *each* plant a pint of water or "starter solution." This is made by mixing ½ cup of *complete* (soluble) fertilizer in 2 gallons of water.

B Thin seedlings promptly to prevent crowding in the row. At first thinning, leave plants 2 to 4 times as thick as the final stand. This insures against early loss. Plants must have enough space to grow well.

C Garden crops can use irrigation in dry spells. These cabbage plants were lightly mulched to retain water. Running water down furrows is good when soil and slope permit. A porous hose can be used between rows.

B Fighting insects and diseases is important gardening job. Do it with dusts or sprays. Sprays are usually better for applying chemicals. On small garden, you can use small knapsack or compressed-air sprayer.



C No garden land should be idle. As soon as the earliest garden crops are harvested, spade soil in which they were grown and plant some other crop. The low wire fence around this suburban garden keeps rabbits out.

(Continued from page 23)

ture, water logging of the soil, poor drainage, or some fixation of an element in the soil. If one of these factors is responsible, you must correct it before you will get normal plant growth.

Generally a 1-1-1 fertilizer ratio of nitrogen, phosphate, and potash in a *complete* fertilizer is excellent for use on your shrubs. Special conditions may warrant a change.

Azalea plants grown for *compactness* and *maximum flowering* have been more acceptable to a 2½-1-1 fertilizer ratio. Increased nitrogen can cause more vigorous plants with denser foliage. While the number of flowers per shoot will not necessarily be increased, this treatment may cause more flowers per plant since more shoots initiate flower buds.

WHEN TO APPLY FERTILIZER

The time to apply fertilizer to shrubs is usually in the spring and early summer. Generally, apply your first fertilizer at the time spring growth begins. Follow with periodic applications *up to early summer.* After this, further fertilization, especially with nitrogen, is usually not advisable.

Most shrubs make only one flush of growth each year. This flush ceases in *early to mid-summer.* Your largest applications of fertilizer should be made during this period of active vegetative growth.

Tapering-off fertilization after early summer has several benefits. Succulent growth is not induced and the plants are better able to withstand cold weather. Many plants initiate flower buds in mid to late summer. Too much nitrogen at this time may reduce the amount of flower buds formed.

Plants should not be deficient in nutrients in the fall. *Repeated tests have shown that well-fertilized evergreens retain more leaves during the winter. Also well-fertilized plants are more winterhardy than are deficient plants.*

HOW MUCH FERTILIZER?

The *amount* applied *at one time* should be your criterion, *not* the amount applied during the season. Other factors to consider are (1) *the amount of organic matter present,* (2) *the soil texture,* (3) *the plant size.*

As a general rule, apply from 2 to 5 pounds of a complete fertilizer, such as 8-8-8, to each sq. ft. for good results. *More frequent applications of fertilizer should be made instead of increasing the amount per application when you want to boost your plant growth.*

Careful use of fertilizer can reduce maintenance and pruning requirements in your home yard. Within limits, the more fertilizer you use the more plant growth you get. Thus, while your plants are small and you want to get rapid vegetative growth, apply fertilizer frequently.

As your plants reach desired size, you may cut down on amount of fertilizer to limit growth—an easier way than heavy pruning to hold your plants in size.

WHAT FORM OF FERTILIZER?

The *form* of fertilizer you use is largely a matter of preference. In some instances, you should watch very closely the form of nitrogen you apply.

For example, with azaleas and blueberries, use of NO_3 nitrogen has resulted in iron deficiency. Generally speaking, *a complete farm grade fertilizer will serve.* Occasionally, you might use liquid instead of dry applications to simplify application and get very even distribution.

WHAT ABOUT ORGANIC FERTILIZERS?

Organic fertilizers do not last as long as commonly believed. A number of studies indicate that about 85% *of the nitrogen that would be released over a period of several months is released within a 3-week period following application.*

Soil temperature also influences re-

lease of nitrogen from organic sources. Release is slow at *40° F* and reaches maximum at *80-90° F.*

Organic nitrogen put on in early spring may not cause plant response because of low soil temperature. But later, with rapid warming, excessive amounts of organic nitrogen may be released.

Action of urea-formaldehyde fertilizer may be the same as that indicated for organic nitrogen.

HOW TO APPLY YOUR FERTILIZER

Method of application, again, is a matter of preference.

Dry fertilization is useful when you desire an inexpensive *complete* fertilizer. Also, some materials are not soluble and can be used only in the dry form.

Liquid applications—where you dissolve the fertilizer in water and apply to the ground through the irrigation system—can save labor but may cost higher by material.

Foliar feeding is useful in special cases *only* where a quick response is desired or when the element is not entering the plant because of some condition.

FERTILIZATION OF ACID-LOVING PLANTS

Basically, you fertilize your acid-loving plants in the same way as all other plants. Usually, too much emphasis is placed on using an acid-forming fertilizer. Where your soil is naturally acid, avoid acid-forming fertilizers because your soil *can become too acid even for the acid-loving plants.* These plants need calcium, which is often the deficient element.

Apply a *complete* fertilizer, such as 8-8-8, *after flowering or as growth begins in the spring.* Apply 5 pounds per 100 sq. ft. of area. Repeat your applications at monthly intervals.

In late summer or early fall, apply 2 pounds per 100 sq. ft. to insure good nutrition before cold weather.

FERTILIZATION OF DECIDUOUS SHRUBS

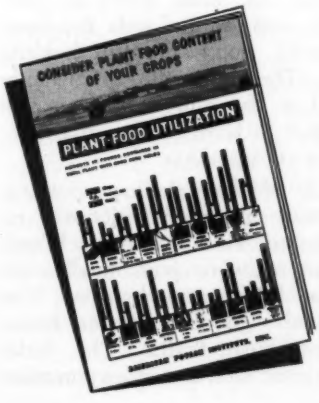
Your deciduous shrubs should be fertilized *only* in the spring. Usually 2 to 3 applications are enough.

Make the first application just as growth begins in the spring. Repeat this 4 to 6 weeks later. Apply a third dose in early summer.

Most deciduous shrubs initiate flowers in *mid-summer.* Don't use high amounts of nitrogen at this time.

Apply *complete* fertilizer, such as 8-8-8, at the rate of *2 to 4 pounds per 100 sq. ft. of area.*

THE END



Consider Plant Food Content of your Crops

- **Ever wondered how much plant food your crops remove from the soil?**
- **This reprint gives a composite picture of N, P, K, contained in good yields of 28 important crops.**
- **It cites large removals by legumes, plant food sources, and the trend toward higher analysis plant foods.**

Write Dept. B.C., American Potash Institute

By Norman F. Childers **Rutgers University**

SMALL fruits are as popular in the home garden as vegetables. For the country as a whole, the strawberry is probably the most widely grown in backyards, followed by grapes and brambles.

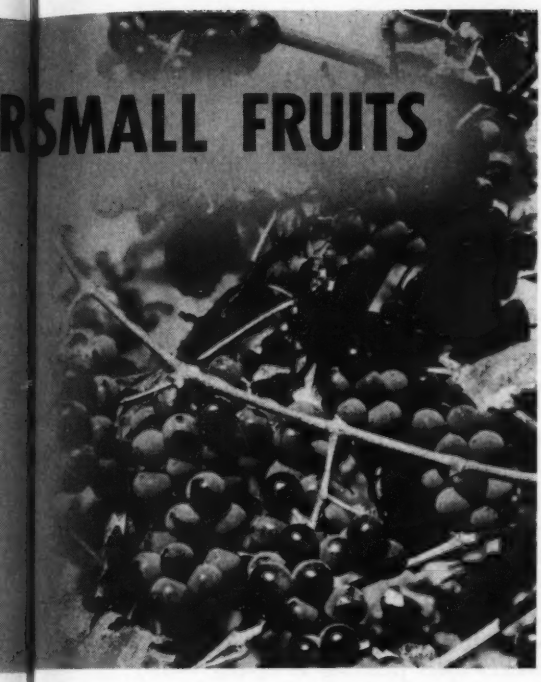
You can plant strawberries one spring and harvest fruit the following spring on standard varieties. For everbearers, you can harvest some fruit late the first summer. If your strawberry field is free from diseases and weeds and kept reasonably vigorous by good management you can harvest successive crops from one planting *for two to four years before replanting.*

With brambles and grapes, it takes from three to four years after planting to harvest sizable crops. This is true with bush fruits, such as blueberry, currant, and gooseberry.

MULCH—FOR SHALLOW ROOT SYSTEMS

The root systems of all small fruits are relatively shallow when compared with tree fruits. You should manage your plants more or less like vegetables. All small fruits do best on fertile, well-drained soils and have a relatively good moisture-holding capacity. The less fertile, more sandy your soil is the more attention you should give to fertilization, irrigation, and water conservation.

Because of their shallow root systems, nearly all small fruits will respond to some kind of mulch. Weed-free grain straw or pine needles are good mulch for strawberries. This mulch is also good for grapes, brambles, and bush fruits. The latter crops respond well to a strawy-manure



of New Jersey

mulch taken from barns. But strawy-manure mulch on strawberries tends to cause too much vegetative growth, *resulting in berries that rot easily.*

HANDLE TRACE ELEMENTS CAREFULLY

If the soil in your backyard is relatively infertile, sandy, and low in organic matter, and you are in a humid section of the country where rainfall exceeds 20-30 inches, you might apply a modest amount of trace elements in addition to nitrogen, phosphorus, and potash. Trace elements will not be necessary if you are using a high fertility mulch. If this is not available, several commercial mixtures of trace elements are on the market. And they can be used easily by following the manufacturer's recommendations.

But one word of warning. Apply trace elements carefully, for doubling or tripling the usual application rate can reduce yields considerably or kill the plants.

You can make a mistake and apply too much of the major elements—nitrogen, phosphorus, and potassium—with much less harmful effects. Here again, however, you should follow recommendations carefully. Just because one pound of fertilizer made the plants grow and fruit well, two pounds will not necessarily make them grow and fruit twice as well. *There is a point where any fertilizer nutrient becomes toxic.*

Under arid conditions of the West where annual rainfall is less than about 10 inches, nutrients other than nitrogen are frequently needed. But as under humid conditions, nitrogen is usually the most important nutrient. There is usually little need for potassium, phosphorus, and magnesium, since leaching is not a problem. If you are in doubt, however, contact your local agricultural advisors. They can give you specific recommendations for small fruits under your local conditions.

Under arid conditions, zinc is sometimes a deficient nutrient, particularly with grapes. Iron deficiency is frequently seen in California, Utah, Washington, and neighboring states. Manganese and boron may be deficient in some areas. There are a few reports of copper and molyb-

Dr. Norman F. Childers, Chairman of the Horticulture Department at Rutgers University, is a recognized authority on fruit nutrition. He has written several books in pomology and has been author or co-author of over 200 technical papers. He earned his B.S. and M.S. at Missouri, where he was a Gregory Scholar, and his Ph.D from Cornell.

denum deficiencies. Sulphur is not usually a problem because this nutrient is applied as an impurity in fertilizers and spray materials, and also may settle in the area from smoke in the atmosphere.

We are beginning to realize calcium may be an important nutrient in humid sections of the United States. This is usually applied also as an impurity in fertilizers, spray materials, and exists in lime, which is used mainly to correct acid soils.

SOME pH NEEDS OF POPULAR FRUITS

Strawberries seem to perform best with a pH around *5.0-5.5; blueberry 4.2-5.0;* and *grapes and bush fruits* at a pH of *5.5-6.5.* If the pH is above 7, often the case in arid sections, you may need to use trace elements—applied either to the soil or as sprays to get proper growth and fruiting. Soils high in pH may have adequate amounts of these nutrients present, *but they are "tied up" so the plant has trouble getting adequate amounts.*

If you are growing your home garden in *high pH soils,* you might use the chelates, according to the manufacturer's recommendation. This sometimes helps correct iron deficiency, which is rather common. Chelates applied to the soil also work in *humid sections* where iron deficiency may be a problem on blueberries, for example. Ammonium sulfate is a good source of nitrogen for blueberries, helping correct iron deficiency in some soils by making the soil more acid.

FERTILIZING SPECIFIC CROPS

Strawberries should be planted on land that has been cultivated for at least one season—to avoid severe injury by white grubs which may infest the sod.

The most widely grown strawberries are the varieties that ripen their fruit over a 3-week period early in the growing season. In home gardens, the everbearing kinds are becoming increasingly popular. These will bear a fall crop the first year of planting and in later years will bear a limited supply of fruit throughout the growing seasons.

If you grow so-called June-bearing varieties, try to get as much plant growth as possible the first growing season, after planting in early spring, so the plants can support a heavy crop the next year.

Where fertilizer is needed, use about *7 lbs. of a 5-10-5 fertilizer for each 100 feet of matted row about six weeks after planting in spring.*

In arid sections where only nitrogen may be needed, use about *1¾ lbs. of a 20% form—such as ammonium sulfate or an equivalent amount in another form—for each 100 feet of matted row.* This practice may be used in humid areas to stimulate growth, particularly after fruiting when the planting will be fruited another year.

Application *after the bearing season* is usually a safe practice. It is questionable to apply fertilizer in early spring of the fruiting year unless there are definite symptoms of *deficiency* and *poor growth.* If not, fertilizer on moderately fertile soil may cause too much growth and soft berries, resulting in rot problems.

We have evidence that strawberries may respond to a dormant season application of superphosphate only. If your soil is known to be low in phosphorus, *two to three pounds of superphosphate fertilizer per hundred feet of row may be applied*

directly on top of the mulch during late winter.

On varieties that bear in the spring only, you should remove all blossoms as soon as they appear the first season after planting. On any planting, you are wise to cultivate and to control weeds.

You should provide *winter protection* for strawberry plants in areas southward to western North Carolina, Tennessee, northern Arkansas, and Oklahoma. In late October, apply four to six inches of wheat straw or similar material over the entire strawberry bed. In early spring, rake this mulch back into the rows and off the top of the plants *after danger of spring frost.*

If your strawberry field is in good condition and fairly free of weeds at the end of the first fruiting period, cut or mow off the tops of the old plants, remove, and burn them. Old strawberry leaves frequently contain diseases.

If you are producing the plants in a matted row, reduce the width of the row to *15-18 inches* and cultivate thoroughly between the rows. Thin the rows by removing the older plants, spacing the younger plants *about six inches apart.*

The raspberry, blackberry, blueberry, and loganberry belong to this group. These plants fruit on canes that grow one season, produce lateral fruiting shoots the next year, then die. These fruits are rather limited in climatic adaptability, and it is important for you to know beforehand if they will thrive in your area.

Be sure to get plants that are *certified disease free.* Set the plants as early as soil and weather conditions permit. Be sure that the hole is big enough to accommodate the root system comfortably. Prune off only the dead and injured portions of the root system. Set the plant about the same depth in the soil at which it grew in the nursery.

Black and purple raspberries are susceptible to the anthracnose disease. These plants come from the nursery with a short handle attached to each. *Cut off this handle as close to the ground as possible immediately after planting and burn it,* for it may contain anthracnose spores. In transplanting any fruit plant, be sure to keep the roots moist at all times.

About a month after planting, you should apply *about ¼ pound of a 20% nitrogen fertilizer or its equivalent to each plant, spread in a ring 8 to 10 inches from the crown.* Sandy soils in humid sections may be deficient in phosphorus and potassium. *Use 12 ounces* of a complete fertilizer, such as 5-10-5 or 5-10-10, spread in a band around each plant, *or 6 ounces of a 10-10-10.* This same amount of fertilizer is applied *each spring thereafter, two to four weeks before growth starts.* This gives time for rainfall to wash the fertilizer down to the root system.

Since brambles are shallow rooted, you might use some form of mulch, carefully checking the soil during dry periods to be sure the plants have adequate moisture. If the moisture is low, irrigate thoroughly at about *weekly intervals.* Brambles are very sensitive to poorly drained soil. So try to avoid these areas.

Plant blueberries and gooseberries about the same depth that they grew in the nursery. But place currants deep enough to cover the lower branches with soil, to encourage a bushy, compact plant.

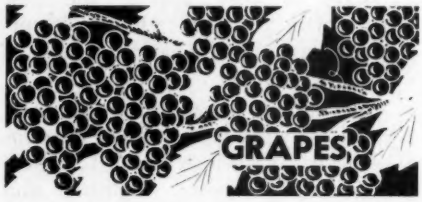
Early-set blueberries are sensitive to fertilizer. If they are growing on a fertile soil, you may not need to fertilize. But nitrogen, such as ammonium sulfate, may help. And sometimes phosphorus and potassium prove very beneficial.

Use two to four ounces of *a 10-10-10 fertilizer around each plant about a month after growth starts in the spring.* If your plant is growing slowly by midseason, apply more sulfate of ammonia—say, one to two ounces per plant the first year. In later years, use *two to four ounces of a 10-10-10 fertilizer around each plant two to four weeks before growth starts in the spring.*

Sawdust makes a good mulch for blueberries if you maintain it 4 to 6 inches deep. You may need an extra application of nitrogen since mulch may cause a nitrogen deficiency when it first starts to decompose.

You should fertilize gooseberries and currants *immediately after planting,* using about two ounces of a 20% nitrogen fertilizer, or equivalent, per plant, or four ounces of a 10-10-10 mixture. If your soil is light textured, apply another ten to twelve ounces per plant of a 10-10-10 fertilizer two to three weeks after growth starts.

Each spring thereafter, use two to three ounces of a nitrogen fertilizer before growth starts, followed with five to six ounces of a 10-10-10 fertilizer during the early part of the growing season.



After planting grapes, choose the best single cane on the plant, cut it back to two buds, and remove the other canes. In humid sections, apply about four ounces of a 10-10-10 fertilizer to the soil around each plant shortly after planting.

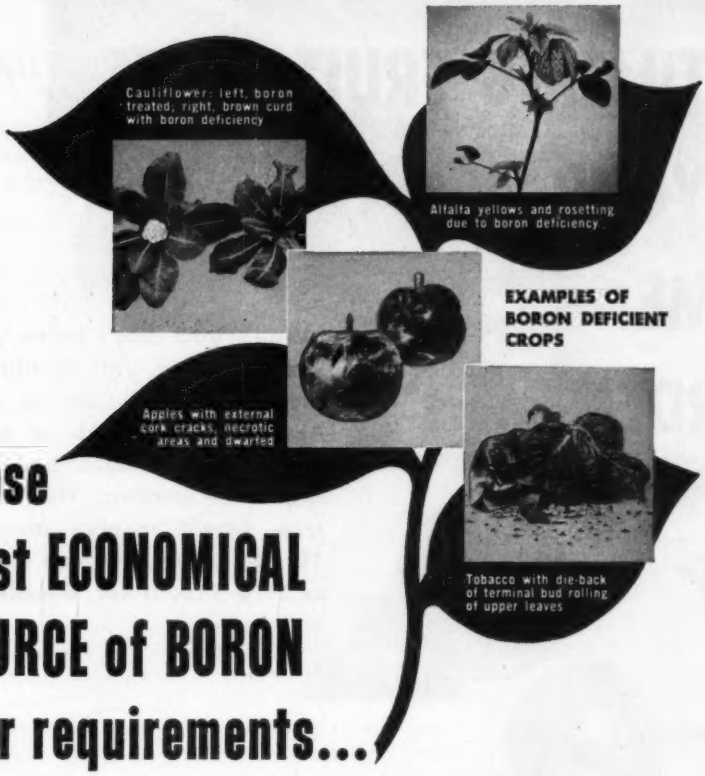
In arid sections, use about two to three ounces of sulfate of ammonia or a similar fertilizer. Apply it at about the same rate each spring a few weeks before growth starts.

Grapes also respond well to a mulch. Strawy manure is good. Or straight grain straw 8 to 12 inches deep. Add applications every second to third year.

In the west, *zinc deficiency* is sometimes a problem on grapes, causing an anemic appearance of the younger and older leaves between the main veins. Check with your local agricultural advisor for specific identification and control. In sandy soils of the east, *magnesium shortage* may appear on the older leaves in a similar manner, with marginal and interveinal scorching. You can combat this by applying high magesium (dolomitic) lime to bring the pH to about 6.5.

In sandy soils of the humid areas, *boron deficiency* may be a problem, causing poor, gnarled growth of the shoot tips and poor or no cropping. A *level teaspoon of borax in three gallons of water poured in the plant rooting area* should cause response in two to three weeks, if boron is your problem. Do this every second or third year.

THE END


Cauliflower: left, boron treated; right, brown curd with boron deficiency
Alfalfa yellows and rosetting due to boron deficiency
Apples with external cork cracks, necrotic areas and dwarfed
Tobacco with die-back of terminal bud rolling of upper leaves

EXAMPLES OF BORON DEFICIENT CROPS

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FERTILIZING FRUIT TREES IN YOUR HOME GARDEN

"When you don't have your soil or leaves tested, you should use a complete fertilizer—such as a 10-10-10. Apply about 1/3 lb. of fertilizer for each year the tree has been growing in the garden. Thus, a 3-year-old tree would receive about 1 lb. of 10-10-10. And if you use a 5-10-10 or 5-10-5 fertilizer, double your rates!"

By
E. G.
Fisher

Cornell
University

THE growth and production of your fruit trees are most often limited by *disease, insects, birds, inadequate pollination, poorly drained soils,* or *winter injury.* To the home gardener, with several large fruit trees, fertilization is not usually a major problem.

SIZE-CONTROLLING ROOTSTOCKS

Spraying and pest control are rather simple on small-sized trees. For this reason, the home gardener should use size-controlling rootstocks for his garden when possible.

Dwarf apple trees are produced by the use of a rootstock known as *Malling IX.*

Pears are dwarfed by grafting on *quince rootstock.*

Cherry trees on *Mahaleb* rootstock are smaller than those on *Mazzard,* though the difference is not as large as described for apples. Also, *Mahaleb* rootstocks require the very best of soil conditions.

Peach trees can be dwarfed by grafting on *Prunus besseyi* or *Prunus tomentosa* rootstock. However, peach trees on standard rootstock can be kept to small size by pruning.

CULTURAL PRACTICES

You can control your weeds by hoeing, mulching, or applying herbicides.

Once you have pests and other problems under control, cultural practices and fertilization become important. All your fruit trees require some elimination of weed competition if maximum tree growth and fruit production is to be obtained.

This is particularly true with young trees. You should completely eliminate weed and grass growth around young trees during the spring and early summer. Hoeing or mulching are two good ways to do this. Herbicides can be used. Consult your local agricultural advisor.

As the tree becomes older, frequent mowing of the ground surrounding it —such as fruit trees growing in a lawn might receive—may eliminate competition for apples and pears. Stone fruits can tolerate weed competition less than apples and pears, and early spring cultivation or mulching may still be necessary with older peach trees.

FERTILIZATION

Early spring, before growth starts, is ideal time to apply your fertilizer.

With pests, rootstocks, and weed competition properly controlled, the home gardener can finally think about fertilization.

When you don't have your soil tested or leaves analyzed, you should use a *complete* fertilizer—*such as a 10-10-10.* Apply about *1/3 pound of fertilizer for each year the tree has been growing in the garden.* Thus, a three-year-old tree would receive about 1 pound of 10-10-10.

If you use a 5-10-10 or 5-10-5 fertilizer, *double* your rates. When using straight nitrogen fertilizer, you might apply ⅛ pound of ammonium nitrate and ¼ pound sodium nitrate annually for each year the tree has been in the garden.

Dr. E. G. Fisher, Extension Pomologist for New York State, is a well-known authority in mineral nutrition. With Dr. Damon Boynton, he developed the Leaf Analysis Service for New York fruit growers. He has also served as pomologist for USDA, working on Tung tree culture in Florida. Additional interests include the use of radioactive isotopes and enzyme relationships in nutrition.

These rates can only be considered average, and should be adjusted to the *natural productivity of the soil and vigor of the trees.*

Early spring, just before growth starts, is the ideal time to apply your fertilizer. Be careful not to apply it any closer than 6 to 12 inches from the trunk and extend the band as far as the spread of the branches.

MULCHING

Watch for winter injury, mouse damage, and fire in dry weather when you mulch.

If you fight weeds with mulching, take special care to prevent winter injury, mouse damage, and to avoid fire during dry summers. Some modification may also be desirable in fertilization. Straw or other low nitrogen mulch materials will "tie up" part of the nitrogen in your fertilizer. So it pays to use heavier than usual rates of nitrogen.

After several years of such a program, your mulch will "break down" and release nitrogen. In such instances or if you apply a high nitrogen mulch such as alfalfa hay, you can reduce your fertilizer application using little or none. Prevent excessive vigor through fertilization or

mulching, because winter injury can result.

SOIL pH AND MAGNESIUM DEFICIENCY

Watch for basal shoot and spur leaves showing a white or yellow interveinal chlorosis . . . followed by browning or scorch and leaf drop.

In New York, most commercial apple orchards have received sulfur sprays and acid fertilizers for many years and show pH's in the 4.0 or low 5.0 range. Here we suggest a regular liming program to aim for a pH of 6.0. New home fruit plantings may not find soil pH far removed from 6.0, but if your soil is considerably more acid (lower in pH), you should use moderate applications of limestone.

Magnesium deficiency is usually the most obvious deficiency found on fruit trees growing in acid soils. In August or September, your basal shoot and spur leaves will show a white or yellow interveinal chlorosis followed soon by browning or scorch and leaf drop. Your tree may become less vigorous and productive, the fruit smaller, fruit quality lower, and the drop of fruit at harvest may increase. Wherever your soil is too acid, use a high-magnesium, finely-ground limestone (20 per cent MgO) to prevent magnesium deficiency.

Occasionally you will find an extremely high soil pH. Minor element deficiencies, such as iron and manganese, can be a problem if soil is close to a pH of 7.0 or higher. Here we purposely select an *acidifying* fertilizer, such as ammonium sulfate, to reduce the pH back to about 6.0. You can see, then, that a simple pH determination can help tell you the fertilizer needs of your fruit trees.

SOIL ANALYSIS AND POTASH DEFICIENCY

Watch for leaves curling around the mid-rib and leaf margins . . . fading and brown margins . . . leaves becoming bronze or light green . . . growing too small.

Do you know how much "readily available" soil potassium you have in your soil? A soil test can tell you. But many problems complicate the interpretation of a potassium analysis.

One of these is the problem of deciding just what solution actually extracts "readily available" potassium. If the interpretation you receive from the laboratory suggests that your soil potassium is very high or high, and particularly if your trees are on a mulching program, you may get by with a straight nitrogen fertilizer (sodium nitrate, ammonium nitrate). But if your soil potassium is at medium or low levels, you should remain with *complete* fertilizer applications —such as 10-10-10.

When you don't apply supplemental nitrogen, watch out for nitrogen hunger on most fruit plantings. Potassium hunger is the next most common problem to watch for, at least in the New York-New England area. Potassium hunger shows up with a curling of the leaves along the mid-rib and leaf margins, a fading and browning of the margins, bronze or light green leaf color, and small leaves. If the hunger is severe, terminal growth will be short, fruit size small, yields light, wood diameter growth poor and susceptible to winter injury.

SOIL ANALYSIS AND PHOSPHORUS FERTILIZATION

Soil phosphorus is another nutrient you can determine by soil testing.

Grass and legumes often respond markedly to phosphorus applications. The same cannot be said for fruit trees. If your soil phosphorus (that is, the amount of phosphorus in your soil) analyzes low or very low, newly set trees may respond to phosphorus applications if a material such as bonemeal or superphosphate is mixed in the hole at planting time.

Less than one ounce of superphosphate should be mixed with the soil taken from a hole large enough to plant the average one-year-old tree. Several ounces of bonemeal may be used. But mature fruit trees seldom show responses to surface applications of phosphorus.

Why, then, do we generally suggest complete fertilizer applications? *Nitrogen and potassium are the two nutrients most often required for fruit trees.* But a fertilizer formulation of only nitrogen and potassium does not remain in good condition without additional phosphorus. The phosphorus may help improve tree performance and ordinarily will do no harm.

If you fertilize the area outside the branch spread, you may increase your cover crop growth, which can be used as mulching material to help improve tree growth.

However, if soil phosphorus levels are extremely high, don't add any more. High phosphorus levels can "tie up" minor elements such as copper and zinc.

SUMMARY

The average home gardener will find that a *complete fertilizer*—such as 10-10-10—will usually fulfill his requirements for deciduous fruit trees. If he has his soil tested, he may occasionally find that he needs to add lime or modify his 10-10-10 program slightly. **THE END**

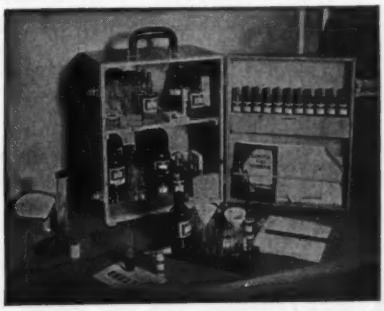
For Reliable Soil Testing Apparatus there is no substitute for LaMOTTE

LaMotte Soil Testing Service is the direct result of 30 years of extensive cooperative research. As a result, all LaMotte methods are approved procedures, field tested and checked for accuracy in actual plant studies. These methods are flexible and are capable of application to all types of soil, with proper interpretation to compensate for any special local soil conditions.

Time-Proven LaMotte Soil Testing Apparatus is available in single units or in combination sets for the following tests:

Ammonia Nitrogen	Iron
Nitrate Nitrogen	pH (acidity and alkalinity)
Nitrite Nitrogen	
Available Potash	Manganese
Available Phosphorus	Magnesium
Chlorides	Aluminum
Sulfates	Replaceable Calcium

Tests for Organic Matter and Nutrient Solutions (hydroculture) furnished only as separate units.



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Standard model for pH, Nitrate, Phosphorus and Potash. Complete with instructions.

Illustrated literature will be sent upon request without obligation.

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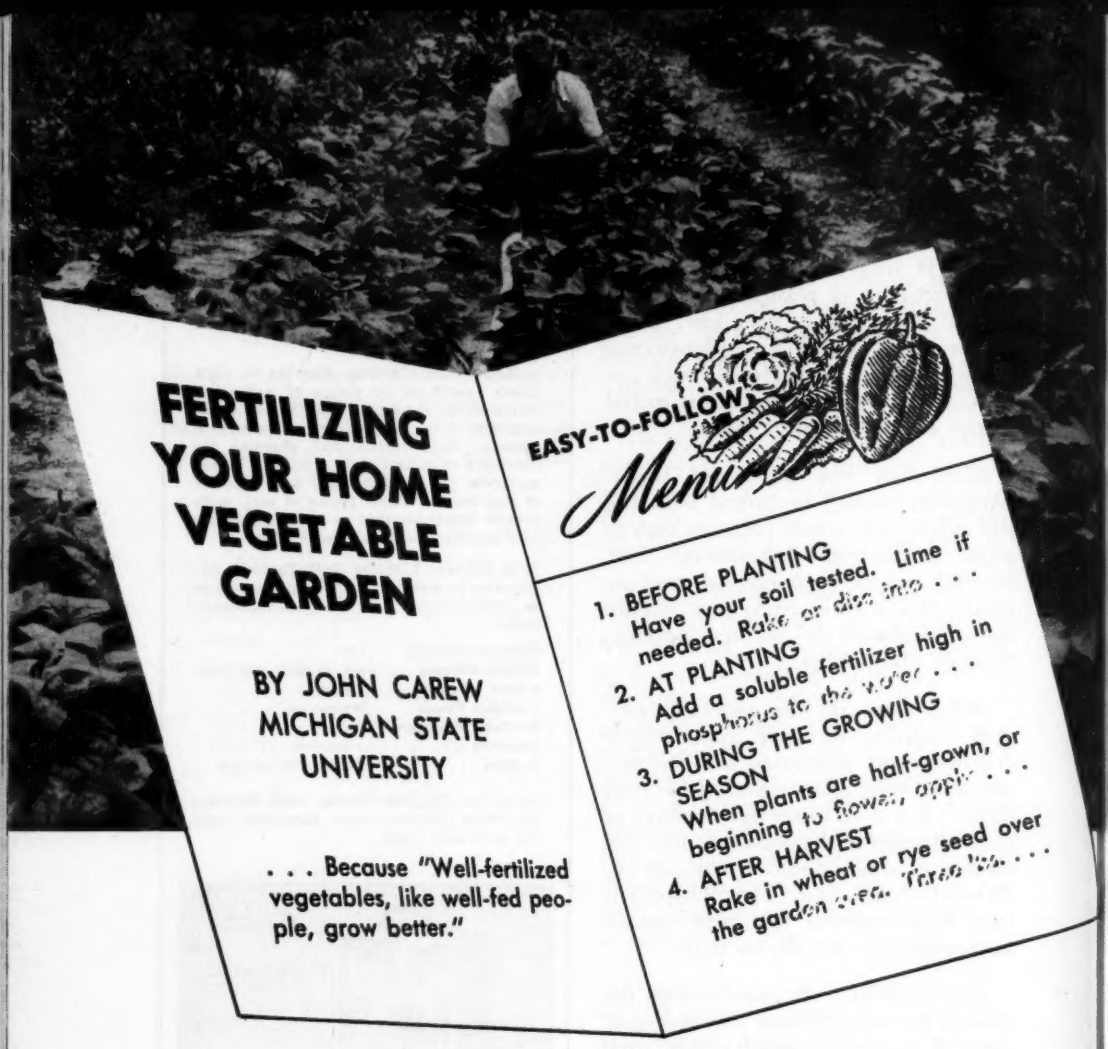

FERTILIZING YOUR HOME VEGETABLE GARDEN
BY JOHN CAREW
MICHIGAN STATE UNIVERSITY
. . . Because "Well-fertilized vegetables, like well-fed people, grow better."
EASY-TO-FOLLOW
Menu
1. BEFORE PLANTING
Have your soil tested. Lime if needed. Rake or disc into . . .
2. AT PLANTING
Add a soluble fertilizer high in phosphorus to the row . . .
3. DURING THE GROWING SEASON
When plants are half-grown, or beginning to flower, apply . . .
4. AFTER HARVEST
Rake in wheat or rye seed over the garden area. Turn in . . .

VEGETABLES, like the people who eat them, need well balanced diets. Nitrogen, phosphorus, and potash along with numerous other nutrients must be available for plants to grow best.

Plants, unlike humans however, manufacture food from *minerals and water* taken up by roots and from *carbon dioxide* taken in through leaves. This remarkable process, which takes place only in light, is called *photosynthesis.* Thus, we really do not feed plants—*we supply the raw materials from which plant sugars and starch are made.*

HAVE YOUR SOIL TESTED

Garden soils vary considerably in their content of essential plant nutrients. Not only that, but the nutrients present may not be in a form the plant roots can use. A chemical analysis, or soil test, provides an inexpensive and relatively accurate indication of the nutrients available.

If the soil in your garden area is fairly uniform, a single one-pint sample, *consisting of smaller samples taken at four or five locations within the garden,*

will suffice. Separate samples should be taken from "trouble" spots or areas you know to be different. Your agricultural leader or garden supply dealer can put you in touch with a soil testing laboratory.

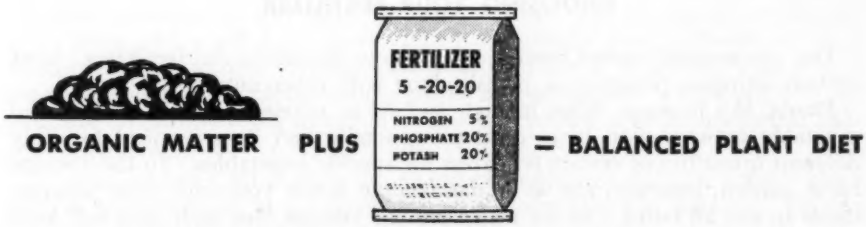
Take adequate soil samples and have your soil tested for its lime needs. In other words, lime by test—not by guess.

ADD LIME IF IT IS NEEDED

Soil tests not only indicate high, medium, or low contents of phosphorus and potash, (nitrogen in some instances) but they also give the soil reaction or pH. This is a measure which tells how acid or alkaline your soil is and forms the basis for indicating how much, if any, lime you need to apply.

Most garden soils have a pH between 4 and 8. Soils above pH 7 are alkaline—below pH 7 are acid. Vegetables generally grow best in slightly-acid soils with a pH between 6.0 and 6.8. Apply lime to soils more acid than this. Fifty pounds of ground limestone per 1000 sq. ft. of garden area will usually raise the pH of the lighter or sandy soils from 5.0 to 6.0. Larger quantities may be necessary on heavier or more acid soils.

Avoid over-liming! Too much lime can be as harmful to plant growth as too little lime. *Lime by test—not by guess.*



RESPECT BUT DON'T WORSHIP ORGANIC MATTER

A small group who call themselves organic gardeners are opposed to the use of chemical fertilizers.

Through private magazines, they advocate greater use of natural organic materials and insist that fertilizers such as 5-20-20, 4-16-16, and superphosphate are harmful to soils, plants, animals, and humans. They even claim that "organically" grown fruits and vegetables will be more nutritious and less

affected by diseases and insects. Unfortunately, their non-scientific, somewhat emotional approach has confused many gardeners.

Organic matter *is* of great value. Well-rotted animal manures or decomposed straw, leaves, grass clippings, and waste plant materials improve the physical condition of soils, supply food and energy for soil bacteria, and furnish plant nutrients. Properly incorporated into soils, they act as a sponge, improving drainage and protecting plants against drouth.

Dr. John Carew, Professor of Horticulture at Michigan State University, is a recognized authority on vegetable production and marketing. Formerly at Cornell, he has traveled widely through vegetable farming areas of the U. S. and Europe. His writings are well known. He is co-author (with Dr. Paul Work) of a textbook used in many universities and consultant to *American Vegetable Grower* magazine.

As valuable as organic matter is, we must recognize its limitations. Regretfully, its use alone will not prevent insect and disease attacks. Nor will organic matter improve the nutritive value of crops. *Scientifically controlled experiments have shown that vegetables grown in solution cultures in the complete absence of organic matter have mineral and vitamin contents similar to those grown in well-manured soils.*

Furthermore, these organic materials alone are *not balanced* sources of plant nutrients. Most organic materials are low in phosphorus. Decaying straw, leaves, and other materials often temporarily deplete the soil of available nitrogen. And they are often difficult or expensive to obtain.

Thus, a *combination* of organic matter and chemical fertilizer can be relied on to produce consistently high yields of top quality vegetables in an efficient manner. Buy manure if it is available at a reasonable price. Make compost piles of leaves, grass clippings, etc. Grow your own green manure in winter by sowing wheat or rye seed when your garden is nearly harvested. *But depend on properly applied chemical fertilizer for your principal source of nutrients.*

CHOOSING YOUR FERTILIZER

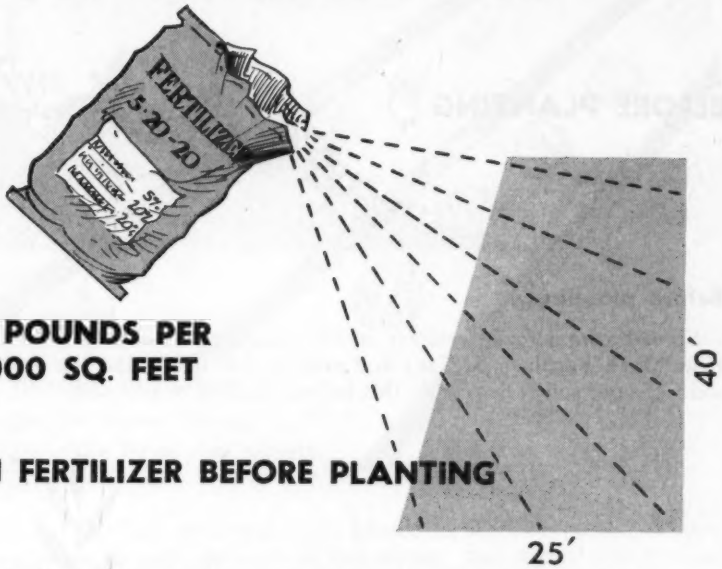
You can generally select from a wide variety of commercial fertilizers. Most contain nitrogen, phosphorus, potash along with other nutrients.

Plants, like humans, differ in their individual nutrient needs. Commercial vegetable growers with large acreages generally find it economical to apply different quantities of certain fertilizers for specific vegetables. In the average home garden, however, just as in the average home, you can't serve separate meals to suit all tastes. *So we try to provide enough that each crop will have plenty.*

HOW MUCH FERTILIZER TO USE

Thirty pounds of a 5-20-20 fertilizer or its equivalent (such as, 40 pounds of a 4-16-16 or 50 pounds of a 3-12-12) raked into each 1000 sq. ft. of garden area before planting will supply enough plant food, with the exception of nitrogen, for practically all vegetables. If you use manure (at least 10 bushels for each 1000 sq. ft.), reduce your fertilizer rate by half.

HOW MUCH FERTILIZER TO USE



30 POUNDS PER 1,000 SQ. FEET

RAKE IN FERTILIZER BEFORE PLANTING

Or 40 lbs of a 4-16-16 or 50 lbs of a 3-12-12 per 1,000 sq. ft.

Additional nitrogen should be applied after the plants are half-grown (leafy crops, greens, and root crops) or when they begin to flower (tomatoes, peppers, beans, sweet corn, cucumbers, etc). Spread 2½ pounds of ammonium nitrate per 1000 sq. ft. or its equivalent (for example, 2 pounds of urea, or 5 pounds of nitrate of soda) in a band along the rows and 3 to 4 inches to the side of the plants.

WHAT ABOUT MINOR ELEMENTS?

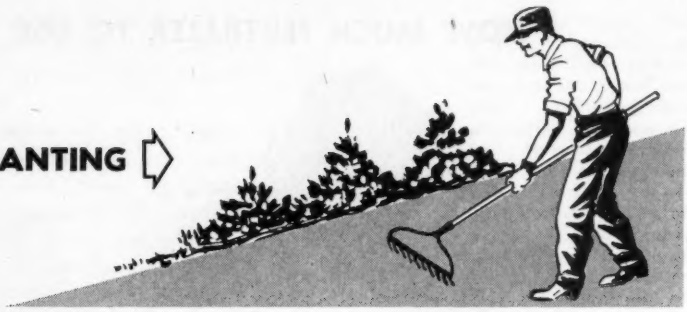
The chances of having a minor element problem in your garden are rare. Whether you need to add minor or trace elements depends mostly on the soil pH. Soils with a pH between 6.0 and 6.5 generally have sufficient calcium, magnesium, manganese, copper, zinc, iron, and boron in a form available to most vegetables. In alkaline soils, boron and manganese sometimes are unavailable to plants, while extra boron and magnesium may be needed in soils more acid than pH 5.5.

If your soil has a pH outside the recommended range and you suspect plant growth is not normal, buy a special minor element fertilizer mixture. Do not add minor elements indiscriminately—*slight excesses will stunt vegetables.*

APPLY FERTILIZER PROPERLY

You might compare the fertilizing of vegetables with the feeding of humans. Both need *easily accessible* sources of nutrition in their youth, a continuous *balanced* supply during their entire life, and both can be harmed by *excesses.*

There is no single "best" way to apply fertilizer. Generally, your plants will grow better if part of the fertilizer is mixed with the soil before planting begins and part is applied later in the season.



Before planting—

Spread commercial fertilizer in the amounts recommended above (under How Much Fertilizer to Use) and rake or disc it into the top 4 to 6 inches of soil. If your soil is heavy, do this before spading or plowing.

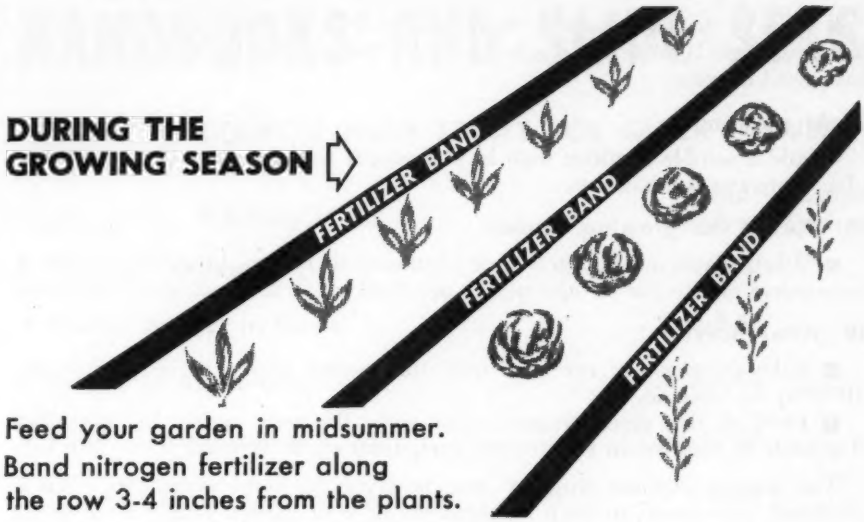
At transplanting—

Young tomato, cabbage, and other plants you purchase or grow for transplanting into the garden will benefit greatly if you will add a *soluble* fertilizer to the water you pour into each hole. Buy either dry or liquid forms, but try to obtain those with a high proportion of phosphorus; for example, 10-52-17 or 10-50-10. Follow package label directions carefully—excesses may burn plant roots.

During the Growing Season—

Your garden will probably need a *midseason "snack"* of nitrogen and perhaps potassium. You can use ammonium nitrate, urea, or nitrate of soda as mentioned previously, or the same fertilizer you mixed with the soil before planting at *5 pounds per 1000 sq. ft. of garden area.*

Make these supplemental applications *when plants are almost half-grown or begin to flower.* Distribute the fertilizer in *one band alongside the crop row and 3 to 4 inches from them.* Avoid leaving dry fertilizer on the leaves. In dry periods, watering the garden will help this fertilizer become more available to plant roots.



Feed your garden in midsummer.
Band nitrogen fertilizer along
the row 3-4 inches from the plants.

What about leaf-feeding—spraying dilute soluble fertilizer on plants? Plants will absorb nutrients through their leaves and stems. *But regard this method as supplemental to standard soil fertilizing.* The amount that can be safely applied in any one spray represents only a fraction of what the plant needs. Most plant scientists compare leaf-feeding with intravenous feeding of humans —warranted only in emergencies.

RECOGNIZE HUNGER SIGNS

Plants can become "sick". Diseases, insects, and unfavorable weather all have their harmful effects. Garden vegetables express their need for fertilizer through hunger signs which are specific for various nutrients. Usually plant growth has slowed down even before these symptoms become apparent.

Yellowed or light green leaves, especially on the lower part of the plant, indicate *insufficient nitrogen.*

Purple-tinged leaves and stems on stunted plants are often a sign of *phosphorous deficiency.* Tomatoes are particularly sensitive. Plants exposed to prolonged cold weather also become purple.

Potash deficiency shows up commonly as a yellowing or browning of edges of older leaves.

The typical hunger signs for most minor elements differ among vegetables. *Boron deficiency* causes cracked stalks of celery and discolored areas on cauliflower heads. A *lack of manganese* in most vegetables is associated with a between-the-veins yellowing of young leaves. *Insufficient magnesium,* in contrast, causes a similar pattern on older leaves.

A SUGGESTED FERTILIZER SCHEDULE

In summary, here is an easy-to-follow menu for your home garden:

I. Before planting:

- Have your soil tested. Lime if needed.

■ Rake or disc into the soil, 30 pounds of 5-20-20 fertilizer (or its equivalent) for each 1000 sq. ft. of garden area. Reduce this by 50 percent if you have used manure.

II. At planting:

■ Add a soluble fertilizer high in phosphorus to the water when you transplant tomatoes, cabbage, etc.

III. During the growing season:

■ When plants are half-grown or beginning to flower, apply 2½ pounds of ammonium nitrate (or its equivalent) per 1000 sq. ft. in bands along the rows.

IV. After harvest:

■ Rake in wheat or rye seed over the garden area. Three pounds per 1000 sq. ft. will do.

■ Fertilize this green manure crop early the next spring by spreading 3 pounds of ammonium nitrate over each 1000 sq. ft. of garden.

This garden "feeding program" may be lavish for some vegetables. But it is almost guaranteed to keep all members of your garden family from being hungry. Well-fertilized vegetables, like well-fed people, grow better.

THE END

NEW FOLDER SERVICE FOR EXHIBIT USE AT FAIRS • CONVENTIONS • MEETINGS

The American Potash Institute recently initiated a new Folder Service offering pocket-size, 3-panel folders on important agricultural subjects. THEY ARE FREE FOR YOUR USE. Order a supply for use in your travels or your teaching or your exhibits. New folders will be coming up all the time. Folders now available are:

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(See page 19 for distribution policy & coupon)

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- Potassium Hunger Signs—Slide Set ($2.20) 22 Slides and Script _____
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FROM COMPANION LAWNBOOK

Companion to Institute's upcoming gardenbook

THREE "BASICS" OF GOOD GARDENING

HOW TO DETERMINE YOUR LIME & FERTILIZER NEEDS

Dr. J. Fielding Reed, Southern Director of the Potash Institute, trained at Louisiana State and Cornell. At N. C. State College, he and his associates conducted soil fertility work in peanuts that won national acclaim in 1948. He also directed soil testing work in North Carolina. He is a recognized authority on the chemistry and fertility of soil.

BEFORE starting fall and spring treatment of their lawns, home owners who want a good lawn but don't know how to determine their lime and fertilizer needs can avoid trouble by (1) securing expert advice, (2) studying reliable circulars, (3) using soil tests.

These suggestions come from J. Fielding Reed of Atlanta, Southern Director of the American Potash Institute and a recognized authority on the chemistry and fertility of the soil, writing in the new Potash Institute handbook, *You Can Grow A Good Lawn.*

Dr. Reed urges home owners to talk to or write to experts who have training and experience—specialists at their agricultural college, state experiment station, or agricultural extension service; their local county agent or vo-ag teacher; personnel at reputable nurseries or seed and garden shops—people who know how to identify trouble and what fertilizers and lime to add and when to add them.

"Many experts have written leaflets and circulars featuring the latest facts on management and fertilization," Dr. Reed reports. These are usually free on request from your local agricultural advisors and reputable dealers.

In every state there are soil testing laboratories, Dr. Reed reports, both state and commercial labs that can determine your soil's lime needs and the levels of plant food and organic matter in your soil. In some states, these soil test services are free, in others a nominal fee is charged.

Dr. Reed explains briefly how to get good soil samples—(1) by using the right tools: a clean bucket, spade, and knife or a soil probe or auger; (2) by knowing what a sample consists of: a composite of soil taken from 10 to 20 places well distributed over your lawn; (3) by knowing what depth to bore for a sample: usually 3 to 4 inches for lawn, to 6 inches for shrub or flower areas; (4) by knowing how to get a sample with a spade: through a V-shaped hole 4 to 6 inches deep, taking a half-inch slice from the smooth side.

Dr. Werner L. Nelson, Midwest Director of the Potash Institute, trained at Illinois and Ohio State and served on the N. C. State College faculty. Member of several national science organizations, he was chairman of Section 10 at the 1952 International Soil Science Society in Dublin, Ireland. He is co-author of the college textbook, Soil Fertility and Fertilizers, published by Macmillan.

LIME AND ITS EFFECTS ON YOUR SOILS AND PLANTS

Lime can be like a factory foreman to your lawn soil, seeing that many factors operate to give top output, according to Werner L. Nelson, Midwest Director of the American Potash Institute and well-known authority on soil fertility and fertilizers.

In the new Potash Institute handbook, *You Can Grow A Good Lawn,* Dr. Nelson explains the effects of lime on soils and plants. He defines exactly what lime is, how soils become acid, why an acid soil needs lime. Relating how lime is the "work horse" in the soil, Dr. Nelson says, "Lime not only corrects the acid in your soil, but it also supplies calcium and magnesium, makes phosphorus more available, speeds up rotting of dead plant material in the soil, and reduces leaching of potassium by rain."

He emphasizes that the only way to "find out if lime is needed is to have your soil tested and secure recommendations for the plants you plan to grow." Most soil testing labs will report how acid your soil is in terms of pH. What does pH mean?

"This pH scale," Dr. Nelson explains, "tells how acid or alkaline your soil is in much the same way numbers of a thermometer show heat or cold. For example, a pH of 7.0 is neutral. Values downward from pH 7.0 show increasing acidity. Values upward from pH 7.0 show increasing alkalinity. A soil with a pH 4.5 is much more acid than one with pH 6.0."

The amount of clay and organic matter in your soil helps determine the lime need at a given pH—that is, a sandy loam soil testing pH 5.5 needs less lime than a clay loam soil testing pH 5.5. The testing labs take this into consideration in their recommendations.

Dr. Nelson concludes his liming pointers by explaining where the lawn grower can get lime, how to apply it on new lawns and gardens, as well as established lawns and shrub areas. Of the few plants that require acid soils, he lists the Irish potato, watermelon, blueberry, azalea, camellia, gardenia, hydrangea, and rhododendron.

Dr. S. E. Younts, Eastern Agronomist of the Potash Institute, was formerly research assistant professor of soils at University of Maryland. He earned his B.S. and M.S. from N. C. State College, his Ph.D. from Cornell. At Maryland, he initiated important research on forage crops.

FACTS ABOUT FERTILIZERS FOR LAWN AND GARDEN MAKERS

When you start looking for fertilizer to boost your lawn or garden will you know what you are looking for—that is do you *really* know what a fertilizer is, what the figures on the bag mean, what's in it, how to use it?

If you aren't sure, S. E. Younts, Eastern agronomist of the American Potash Institute, offers some useful facts about fertilizers in the new Potash Institute handbook, *You Can Grow A Good Lawn.*

Dr. Younts says, "Fertilizer is a substance used to supply one or more of the chemical elements necessary for the soil to produce plant growth."

There are 16 of these elements, he explains. Three of them—carbon, hydrogen, and oxygen—occur in air or water for plant growth. The remaining 13 elements must be available in the soil or added to the soil for normal plant growth. They include what are called the primary nutrients—nitrogen, phosphate, and potash; the secondary nutrients—calcium, magnesium, and sulfur; the trace elements—iron, zinc, copper, boron, manganese, molybdenum and chlorine.

Dr. Younts explains the meaning of fertilizer material, grade, and ratio—how a 100-lb bag marked 10-10-10 contains 10% each of nitrogen, phosphate, and potash (totaling 30%) and how the other 70% may be made up of varying quantities of calcium, magnesium, and sulfur, plus some carbon, hydrogen, oxygen, and trace elements, plus some material to keep it in good working condition and free from caking.

He explains that fertilizer grade means the percentage by weight of nitrogen, phosphate, and potash in your fertilizer mixture. (The three numerals, 5-10-10, stand for nitrogen, phosphate, and potash in that order.) And ratio means the ratio between those nutrients. For example, if you buy a 5-10-10 grade, you have a 1:2:2 ratio, or twice as much phosphate and potash as nitrogen. And if you buy a 10-20-20 bag, you have the same ratio—1:2:2—but twice the concentration. That is, 50 pounds of 10-20-20 would do the same job for you as 100 pounds of 5-10-10.

With these facts in mind, Dr. Younts advises lawn makers to look for the grade on their bag, know what they need, and base their usage on it. He discusses some specialty materials, such as organic fertilizers and urea-form nitrogen. He gives five good reasons for using fertilizer and four basic rules for getting the best results from it.

Good for long-time use—this fall, next spring, for many seasons to come—the 32-page lawnbook (with 4-color cover) is a companion to the Potash Institute's upcoming gardenbook. Both booklets can be secured by writing Dept. B.C., American Potash Institute, 1102 16th St., N.W., Washington 6, D.C. Please indicate which booklet you want—Lawnbook and/or Gardenbook.

THE END

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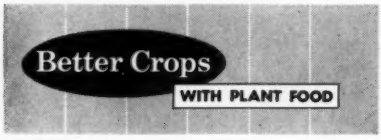
IMPORTANT ANNOUNCEMENT

In the March-April issue of this magazine, which was devoted to lawns, the American Potash Institute announced it would combine that issue with a garden issue into a handbook on lawns and gardens. Due to the tremendous demand for the lawn issue, the Potash Institute has decided to develop *separate* handbooks, in the hope that they will be more useful to lawn and garden makers as individual manuals. Distribution for the lawn handbook will be as follows:

You Can Grow A Good Lawn (A 32-Page Handbook with 4-Color Cover)

Price 6 cents each.
In lots of 100 copies at $5 per 100.
Up to 25 copies *free* to official agricultural advisors and fertilizer firms.

LOOK INSIDE FOR CONVENIENT ORDER COUPONS



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